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Original Contributions.

ANATOMIC CHANGES IN THE HEAD, FACE, JAWS AND TEETH IN THE EVOLUTION OF MAN.

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In his evolution man has undergone many changes. Some structures have been added, others lost. From Thales to Darwin the attempt was made to discover the laws governing these changes. Empedocles, 495 B. C., outlined from his study the doctrine of evo-

FIG. 1.

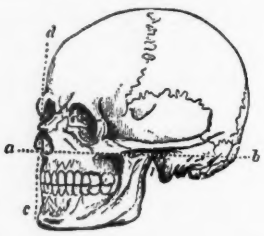
lution, involving therein the survival of the fittest. Aristotle, 384 B. C., viewed the relation of the structures and organs to each other from the standpoint of a hypothetic law of economy of growth, by which structures were sacrificed as entities to benefit the organism as a whole. Goethe in 1809 and St. Hilaire in 1818 still further cleared this law of obscurity. Study of this revealed a struggle for existence between organs with interaction consequent on use and disuse of structures. Camper employed this law in his use of the ideal face of the Apollo Belvidere to illustrate the gradual retreat of the jaws from lower to higher types of face. (Fig. 1.)

The facial angle of Camper, Cuvier, Cloquets, Jacquarts, the

Munich-Frankfort angle, and that of Topinard, involve merely the bones of the face, not the inferior maxilla. Most authors dealing with prognathism and orthognathism include, therefore, merely the superior maxilla in the conception. Stomatologic specialists must include the inferior maxilla in the outline in order to determine what may or may not be required in improving the jaws and teeth. In my studies of the etiology of irregularities of the jaws and teeth I have simply extended the facial line downward below the lower jaw. (Fig. 2.) An imaginary perpendicular line dropped from the superciliary ridge below the lower jaw decides whether the jaws be prognathous or orthognathous.

The ideal face of Camper is a norm which shows where anatomic progress ceases and pathologic begins. At one stage in the evolution

FIG. 2.



of man the eyes, face, nose, jaws and teeth were most essential in obtaining food for the nourishment of the body, and equally so in sexual selection. As man developed, owing to brain increase, he acquired the power of obtaining and digesting food with less expenditure of physical strength. Disuse of the jaws and teeth, owing to their becoming less a factor in food-getting, induced atrophy.

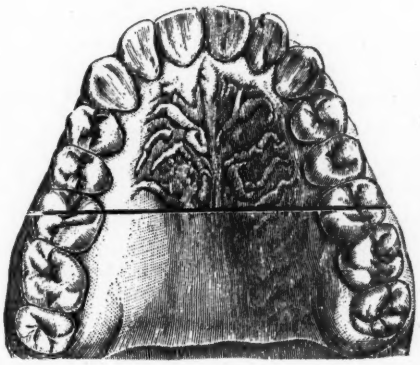
The modern North American negro is an apt illustration. The evolution of the negro in North America has been most wonderful, mentally and physically. In two hundred and fifty years he has developed from primitive conditions to equal in many cases the Caucasian. Typically the negro is long-headed (dolichocephalic), with a face extending beyond the perpendicular line (prognathous). At the present time nearly fifty per cent of negroes have faces on the line. Up to this period of facial atrophy the cavities of the nose were large enough for the purpose of breathing, the jaws were large enough for the teeth; the teeth rarely decayed, and interstitial gingi-

vitis (owing to large, well-developed alveolar processes) seldom occurred.

While healthy recession is still progressing under the law of economy of growth, the perpendicular line remains the dividing line between the normal and abnormal.

Associated with antero-posterior arrest is lateral arrest of the face, which as a rule is about as great as the former. In such cases protrusion (excessive development) of the nose and upper jaw often occurs. The lower is usually arrested. The contraction begins at the upper border of the nasal bones at their junction with the frontal, extending downward to a point midway between the angle of the

FIG. 3.



lower jaw and the symphysis of the chin. Some idea of this lateral contraction is given by Mummery's measurements of ancient British and Roman skulls. These from the outer surface of one first molar to the outer surface of the other (*Fig.* 3) showed a width average of 2.50 inches. Measurements of Americans revealed an average of 2 to 2.19 inches in normal people, showing a difference in lateral development from those of Mummery of about 0.30 of an inch. The effect is to produce a narrow (hatchet) face.

In order of developmental atrophy of the face, the dividing line between the normal and abnormal in jaws and teeth would occur when the jaws from outside of the first molars measured from 2 to 2.20 inches, and the antero-posterior atrophy brings the face on or inside the perpendicular line. In a general way these two points are the lines of demarkation between normal and abnormal. Struc-

tures which degenerate for the benefit of the organism as a whole are transitory. At these two points, owing to arrest of development, the stigmata of degeneracy are most marked, and here the normal ceases and the pathologic begins.

Conditions which modify healthy degeneracy or normal atavism are ordinary and socially consanguineous marriages, intermixture of races, climate, soil, food, etc. These, however, do not produce such marked arrests and excessive development as are caused by an unstable nervous system in the parent as well as in the child.

Even folk-lore, the science of primitive man, accepts direct relation of deformities in the child to the parent. Its taboos and charms are often attempts to regulate these. With that stage of development of the religious sense marked by assigning malign occult powers to natural objects and forces, this view of degeneracy became systematized, and exposed weakly or deformed offspring, charged to evil powers, to death. This occult conception of degeneracy is even yet a part of American folk-lore. Against degenerate children charms are still used by the "witch-doctors" among the Pennsylvania Dutch, who are on the level of culture of the early seventeenth century middle English, if not a little below it. The folk-lore of these, as embodied in Shakespeare, demonstrates, according to J. G. Kiernan, that ere the seventeenth century the fact that "mental and moral defect expressed itself in physical stigmata was recognized and even the term used." "It is an old prejudice," Thistleton Dyer remarks, "not yet extinct, that those who are defective or deformed are marked by Nature as prone to mischief."

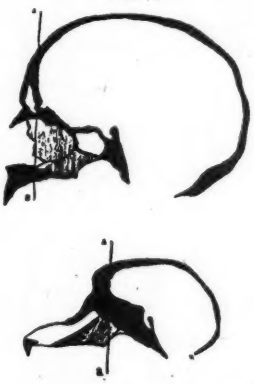
In "A Midsummer Night's Dream" Oberon wards off degeneracy from the issue of happy lovers by the charm—

> "And the blots of Nature's hand
> Shall not in their issue stand;
> Never mole, hare-lip, or scar,
> Nor mark prodigious, such as are
> Despisèd in nativity,
> Shall not upon their children be."

"So many several ways are we plagued and published for our father's defaults," remarks old Burton (Anatomy of Melancholy, 1652), "in so much that as Fernelius truly saith, 'It is the greatest part of our felicity to be well born, and it were happy for human kind if only such parents as are sound of body and mind should be suffered to marry.' A husbandman will sow none but the best and

choicest seed upon his land; he will not rear a bull or horse except he be right shapen in all parts, or permit him to cover a cow or mare except he be well assured of his breed; we make choice of the best rams for our sheep, rear the neatest kine, and keep the best dogs. And how careful, then, should we be in begetting of our children. In former times some countries have been so chary in this behalf, so stern, that if a child were crooked or deformed in body or mind they made him away; so did the Indians of old, by the relation of Curtius, and many other well-governed commonwealths, according to the discipline of those times. 'Henceforth in Scotland,' saith Hect Boëthius, 'if any were visited with the falling sickness, madness,

FIG. 4.

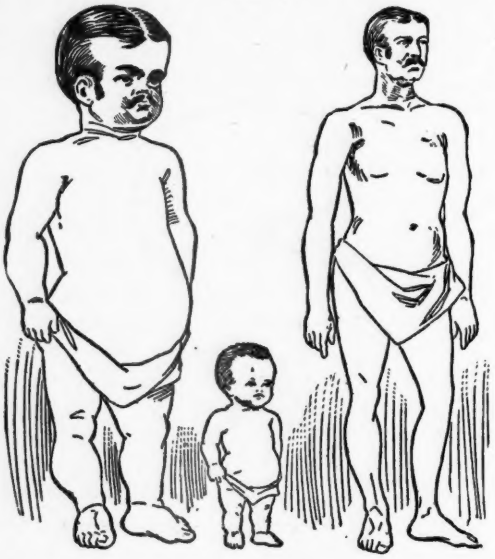


gout, leprosy, or any such dangerous disease which was likely to be propagated from the father to the son, he was instantly gelded; a woman kept from all company of men; and if by chance having some such disease she were found to be with child, she with her brood were buried alive;' and this was done for the common good, lest the whole nation should be injured or corrupted. A severe doom, you will say, and ought not to be used among Christians, yet more to be looked into than it is. For now, by our too much facility in this kind, in giving way for all to marry that will, too much liberty and indulgence in tolerating all sorts, there is a vast confusion of hereditary diseases, no family secure, almost no man free from some grievous infirmity or other, when no choice is had, but still the eldest must marry, as so many stallions of the race; or if rich,

be they fools or dizzards, lame or maimed, unable, intemperate, dissolute, exhaust through riot, as he said, they must be wise and able by inheritance. It comes to pass that our generation is corrupt, we have many weak persons both in body and mind, many feral diseases raging among us, crazed families; our fathers bad, and we are like to be worse."

The unstable nervous system of the parent which produces arrests and excessive development in the child is often due to excesses in-

FIG. 5.



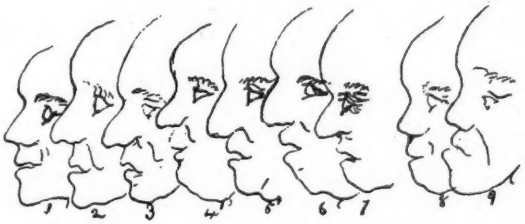
volving toxic agents. These are divisible into those belonging to the condiments, medicines, foods and beverages, those arising from occupation, and the autotoxemias. Tobacco, alcohol, opium, tea, coffee and cocain, as well as lead, mercury and brass, produce toxic effects. Excesses in a social way, late hours, etc., may produce profound systemic nervous exhaustion with autotoxemia in the ancestor and especially the ancestress, likely to be transmitted as degeneracy to the descendant.

The acute and chronic contagious and infectious diseases in the parent, especially the mother, necessarily exert the same toxic in-

fluences upon the fetus, impoverishing it, and checking healthy nutrition. The factors producing degeneration in the child are due to a nervous exhaustion in the first generation, which implies a practical degeneration in function, since tone is lost.

Every nerve cell has two functions, one connected with sensation and the other with growth. If the cell be tired by excessive work along the line of sensation or motion, the function as regards growth becomes later impaired, and it not only ceases to continue in strength but becomes self-poisoned. Each of the organs (heart, liver, kidneys, etc.) has its own system of nerves (the sympathetic ganglia) which, while under control by the spinal cord and brain, act independently. If these nerves become tired the organ fails to perform its function, the general system becomes both poisoned and ill-fed,

FIG. 6.



and nervous exhaustion results. In most cases, however, the brain and spinal cord are first exhausted. The nerves of the organs are thus allowed too free play, and exhaust themselves later. This systemic exhaustion has local expression in the testicles in the male, in the womb and ovaries in the female. Through this the body is imperfectly supplied with natural tonics (antitoxins) formed by its structures, and the general nervous exhaustion becomes still more complete. All the organs of the body are weakened in their function. Practically, the neurasthenic in regard to his organs has taken on a degenerative function, albeit not degenerating in structure, since the restlessness of the organs is a return to the undue expenditure of force which occurs in the lower animals in proportion as it is unchecked by a central nervous system. Through the influence of various exhausting agencies, the spinal cord and the brain lose the gains of evolution, and the neurasthenic is no longer adjusted to environment.

Since the reproductive organs suffer particularly, children born after the acquirement of nervous exhaustion, more or less checked in development as the influence of atavism is healthy or not, repeat degenerations in the structure of their organs which in the parent were represented by neurasthenic disorders in function. As the ovaries of neurasthenic women are markedly affected by the nervous exhaustion, the offspring of these do not retain enough vigor to pass through the normal process of development.

On embryonic development maternal environment exercises an enormous influence in the direction of arrested or progressive development. Maternal shock produces arrests of development which are not photographic conditions, but survival of embryonic states. While maternal impressions do have an effect, it is simply in conditions of arrest and not in photographic reproductions of the alleged cause of the impression. In intrauterine life, periods of stress occur around which, as Kiernan remarks, the disappearing and developing tendency of organs necessarily centers. At these periods certain functions and structures are to be lost by the disappearing and others gained by the developing organs; maternal shock checks proper progress at these periods.

When systemic balance, the result of evolution, is disturbed by change in environment, the organs, as has been shown experimentally by Jacques Loeb, do not pursue their usual growth. Such disturbances are peculiarly apt to occur during periods of stress because of the then varying relations of different organs. Struggles for existence on the part of the different organs and systems of the body are hence most ardent during the periods of intra and extrauterine evolution and involution. During the first dentition, during the second dentition (often as late as the thirteenth year), during puberty and adolescence (fourteen to twenty-five), during the climacteric (forty to sixty), when uterine involution occurs in woman and prostatic involution in man, and finally during senility (sixty and upward), mental and physical defect may, as I have elsewhere shown, be evinced in a congenital tendency which has remained latent until the period of stress.

The first period of stress is the most important so far as the head, face, jaws and teeth are concerned. It is called the senile or simian period and occurs at four and one-half months of fetal life. The influence of neurasthenia in the parent may result in a bony arrest of

development shown to occur in animals by Charrin and Gley, and in man by Coolidge. The facial bones, jaws and teeth are peculiarly liable to be thus affected. Though the effect of disease on the parent be but temporary, the child's development may be checked as to higher tendencies.

The factors entering into the struggle for existence most markedly involve the relations of the brain to the head and face. During intrauterine life the face loses and the brain gains. During the first extrauterine period of stress, between birth and three months, the brain is one-fifth the weight of the body, while in the adult it is but one-thirty-third. During the first six months the brain doubles

Fig. 7.

in weight. The effect of stress during this period would, under the law of economy of growth, either be felt in diminution of the quality or quantity of the brain or in the preservation of these at the expense of more transitory structures like the face, nose, jaws and teeth. This is well illustrated in the contrasted skulls here shown (Fig 4). After birth the face gains at the expense of the brain. The body and face as a whole so gain on the growth of the brain that, as Havelock Ellis remarks, further growth from the third year onward, though an absolutely necessary adaptation to environment, is to some extent growth in degeneration and senility. The loss of child potentialities is well shown in Fig. 5, where the perfectly developed being fulfilling the promise of the child is contrasted with the man that the child actually becomes.

Struggles for existence on the part of the different organs and systems of the body are most ardent during the periods of intra and extra-uterine evolution and involution. At the periods of sex-differentiation, and the simian or senile period (Fig. 4), irregular balance given the struggle for existence leads to imperfect sex-differentiation or premature senility. This last often produces irregular and incomplete ossification. Since, as Harriet Alexander has shown, degeneracy is a process of evolution leading to alteration of form because of cessation of inhibition in certain directions resultant on diminished work, it logically follows that since diminished function precedes change of structure, increased function checks the change of structure in its bichemic stage. Nay, more, structural elaboration due to gains from degeneracy may be retained while degenerate structures resume their higher functions. Hence, a degenerate race may rank higher in evolution because of the beneficial variations due to degeneracy. The structures of the face, as Minot has shown in man, are degenerate as viewed from the vertebrate type. They are structures which quite early in evolution have been sacrificed to the gains of the central nervous system. (Fig. 5.) On them, therefore, do struggles for existence between organs leave decided marks. The jaws and face are less marked in type with rise in evolution.

The reverse phase of evolution, with which Camper did not deal, is that of which the present paper treats. This phase of evolution underlies all pathology of the face, as well as of the nose, jaws, alveolar process and teeth. The illustrations, supplementing those of Camper, portray this reverse phase, where symmetry of the body as a whole is sacrificed to changes in the nose, jaws, alveolar processes and teeth, so as to preserve brain gains.

The next illustration (Fig. 6), taken from photographs of patients, accurately portrays arrests of the face for the benefit of the brain. The gradual recession of the face and the forward development of the brain is a gradual continuation of Fig. 1 in the line of evolution. From the relations of this face-degeneration nearly all diseases of the nose, jaws, alveolar processes and teeth result. In many cases reverse evolution progresses still farther, till, owing to an unbalanced nervous system and movements of the lower jaw, atavism results. Illustrations 8 and 9 in Fig. 6 exhibit a greater exaggeration of the lower jaw—a return to the anthropoid and lower negro type.

Two facial types result from arrest of development. Fig. 7 shows the arrest antero-posteriorly, while Fig 8 shows lateral arrest. All other forms of arrest are modifications of these two. They may become either more intense or less marked.

Through phases of the evolution of man affected by an unstable nervous system, either in parent or child or both, arrests and ex-

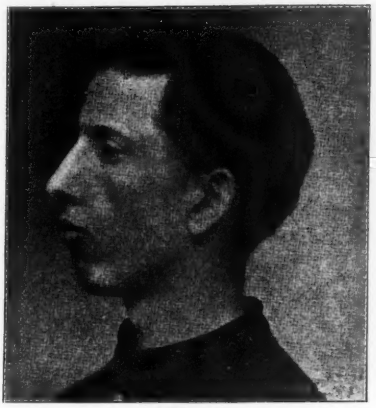


Fig. 8.

cesses in development (degeneracies) may occur in the face, eyes, nose, jaws, alveolar processes and teeth, and form the foundation of all pathology of these structures.

CERVICAL OUTLINE PRESERVATION AND CROWNS.

BY DEAN R. PHILLIPS, D. D. S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

In perfect physiological conditions, around the root of a tooth, from apex to enamel border or gingival line, is the peridental membrane, and its function is to nourish and retain the root in its bone-like socket. At the gingival line the peridental membrane merges with the periosteum and the gums, which cover the outer surfaces of the alveolar process, and a free margin or cervical margin of gum tissue, known as the gingivæ, extends slightly crownwise over the cervical border of enamel about the neck of the tooth. The circulation of the peridental and periosteal membranes and the gums is continuous and irritation of the last will in time affect the others. The

line of demarkation between the gum margin and the enamel is called the cervical outline.

In asking your attention to the subject of cervical outline and its preservation in crown work, I do not offer a new crown or a new method—those are with us always. I desire to emphasize some features of construction which are hygienic and esthetic, and that ameliorate or prevent the diseased condition of the gingivæ and deeper tissues common about many crowns. Cervical outline is the rallying point in an attempt to elucidate the question of health and appearance about roots supporting crowns. It is the cornerstone of an endeavor to use principles which simplify by reproducing the natural; and it therefore becomes a guide to the prosthetist by which there may always be secured a more or less correct idea of the form, outline, poise, color, occlusion, protection and other points necessary to the harmonious adaptation of the crown to its position and surroundings.

The diseased condition found about many roots supporting crowns is due to faulty adaptation and form of the latter, and this fault is in greater part due to our incomplete understanding of the mutual dependence for protection existing between the tooth and the cervical gum margin. The gingival ridge, labially, buccally and lingually, gives a diameter at the crown greater than that at the neck, and affords a protection beneath which the gingivæ tenaciously cling.

Because deleterious particles of food are more readily retained between the teeth, the necessity of a protected and healthy gum, labially, buccally and lingually, is not so much thought of as is the interproximal gum septum, and hence it is not so widely realized that disease, inimical to continued usefulness of the root, is certain to appear wherever the gum margin is not protected in health. Once understand the necessity of the protection afforded to gum margin by the diminished size of the tooth rootwise from the crown, and the construction of crowns with prophylactic intent toward the tissues supporting the root immediately follows, for health of the gingivæ prevents disease of the underlying tissues.

Necessarily a clear mental conception of the finished crown must precede the details of its construction, and there is no better inspiration to such conception than to first determine the true artistic position of the cervical outline. Having determined that, the adaptive

form necessary to retain or place the gingiva in health about the neck of the crown follows intuitively. Once determine the position of the cervical outline and you have the master key to the problem, and the cervical outline becomes the circumference within which you may work, compelling root preparation with reduction sufficient to admit the crown within its natural limits, and in that bringing us nearer to an accurate reproduction of nature.

Not inaptly the cervical outline may be termed the base line dividing the sub and super structure, for when once its position is determined all the other lines and parts follow harmoniously. No competent architect would attempt to design and construct a useful and beautiful building without a permanent base line, and it is reason-

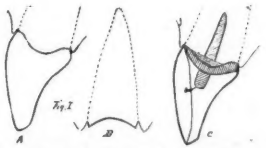


Fig. I.—A—Mesial view of natural tooth, showing gingival ridges. B—End of root, labial view, prepared for porcelain crown. A convex end labio-lingually is retained at the mesial and distal borders. See outline of cap at C. This permits lowering of post and gives greater bulk of porcelain about the post.

able to have, use and retain in crown work a base line from which the lines of form may spring and likewise conform to, for its change from the normal is always displeasing in effect. Its perfectness has more to do with naturalness than any other feature about the tooth or crown. Many discolored and disfigured teeth remain in the denture harmoniously so long as the cervical outline is perfect, but change that and all of the esthetic is gone.

You, I am sure, will agree that the nearer an approximal filling restores the ideal form the more artistic it is and the more useful it will be, and that the nearer the cusps of a crown approach to natural form the greater are their utility and value. Mutilation in the active sense is passed, and in the passive sense is nearly so. Consequently we realize the worth of ideal cusps and natural contact, and it is now only a little journey until realization of this hygienic and esthetic feature will force an appreciation of protective form in all restorations, operative or prosthetic, necessary at the cervical outline. Whenever the free margin loses its natural outline and form we have a disturbed, unnatural effect, the harmony of

the teeth with their surroundings is broken, and a sense of loss and confusion prevails. If this change of cervical outline be extensive the effect is distorting and barbarous. In a way this effect is well understood and striven against, as is shown by the regularity of festoons in all plate work; but in crown work symmetry of cervical outline is frequently neglected, often bad, and on the whole may be much improved. Very properly much attention is given to natural occlusion and contact, but correct form at other points is equally if not more important.

To illustrate, a crown itself is not subject to pathologic change, nor is it, except at the cervix, in constant contact with tissues that are, hence it is extremely doubtful if partial failure in perfect occlusion will cause pathologic change at all equal to that which may be caused by an equal per cent of failure in adaptive form about the cervix. A full mesio-distal spread, reaching from contact point to contact point, is imperative for the health of the interproximal gum septum. In other words, the gum when protected in the interproximal space stays there in good health and does not recede. With a like per cent of protective contour the gum will stay with equal health at given points labially, buccally or lingually, and in many cases where there has been protrusion or recession of the gum it may be induced to return and remain at proper position by a slight exaggeration of the protecting contour.

Careful observation of many crowns shows that the tissues supporting those having good natural form resist pathogenic agencies far better than where the crown has little if any such form. In many cases the tissues remain physiologically perfect, in contradistinction to those of poor form where inflammation or recession of gum, endangering the continued usefulness of the root, appears almost immediately after crown is placed. We easily realize that the material composing the crown is not of itself a factor of irritation, for gold, platinum and porcelain, when not irregular or ragged in form, are easily tolerated by the tissues. But when the natural tooth form is destroyed, as by extensive decay, or submerged, as by addition of calculus or a poorly adapted band, there is sure to be irritation of the gingivæ, followed by disease of the supporting tissues about the root. The deduction from this evidence is that natural tooth form, entire, is necessary in crown construction for the healthy preservation of the supporting tissues, where we have had so much

trouble in the past. The bucco-gingival ridge, the linguo-gingival ridge, the lingual pitch of the lower molars and bicuspids, and the lingual swell of the upper bicuspids and molars, become as fully alive to us as factors of protection against disease of the deeper tissues as the mesio-distal spread giving contact.

It will help in realizing the necessity and significance of natural form in cervical outline preservation as a factor in permanent hygienic and esthetic crown work, to note the point of greatest labio or bucco-lingual diameter of a tooth, compared with that of the neck; also the curvature of gingival line. (Fig. 1.) Then note the relation of the teeth in occlusion. (Fig. 2.) See how effectively the gingivæ are protected from injury during mastication by the acute bulge of

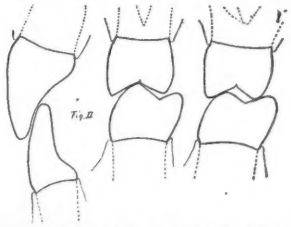


Fig. 11.—Mesial view, showing relation of teeth in occlusion and how natural form protects the gum labially, buccally and lingually during mastication. Our anatomists give the measurements of teeth labio or bucco-lingually at greatest diameter, but they do not give us measurements in same direction at the neck, as is done mesio-distally. Considering the function of the gingival ridge in protecting the free gum margin labially, buccally and lingually, this omission is of great importance and needs emphasis.

enamel just above the cervical line at the greatest labio or bucco-lingual diameter. Notice the overhang and slope of the labial, buccal and lingual surfaces, by which the gingivæ are protected from pressure and laceration by passing food. Then question yourself if the inflamed or shrunken gingiva about your crown is due to imperfect form and adaptation, or to other causes.

In crown work the duty of the prosthetist is threefold. 1st. Restoring the functions of speech and mastication. 2nd. Protection of the supporting tissues about the root. 3rd. The esthetic—restoration of the features. The first is pretty well understood by every one, including the laity. The second when better appreciated in crown work will result in fewer lame and lost roots. The third merges with and emphasizes the second, for protection to the parts, with preservation of a normal cervical outline, is the key to all esthetic restoration.

Normally the gum tissues are strong and firm, having little sensation, but in disease or injury they may become extremely sensitive, and practically without exception the first sign of disease, destructive to the deeper tissues, is indicated at the free margin. This pathological condition may be due to any one of several obscure, puzzling and stubborn causes, but the most frequent and most easily remedied cause is hard, irregular form beneath the free margin about the neck of the tooth, which, without removal, will cause an inflammation, with change of cervical outline, that may extend destructively to the deeper tissues. It is impossible to have about the neck of a tooth a hard, irregular or cutting and unnatural form and not have irritation and inflammation, and while calcic deposit is the most frequent disturbing element found, a poorly adapted crown will be equally as disastrous. In either case the destructive changes will be similar. Nature's constant effort to absorb or extrude the foreign body from a position natural to the gum alone may and frequently does result in sacrifice of the tooth in order to win the struggle.

The gum, the pericementum, and the alveolus supporting the root, rely upon the natural crown for protection, and if the artificial crown lacks natural form to the extent of failure in this protection it will either produce irritation and inflammation of the gum, with change of cervical outline, followed by pericementitis and absorption of the alveolus with loss of tooth; or it will permit, by pressure of food, a forced recession of the gum beyond the cervical margin of crown, allowing decay of the root beneath the crown.

It is not my purpose to enter into a disquisition as to the merits or demerits of any system or systems of crownwork; but to acknowledge and give credit to any, or to any part that may be best used after careful consideration of the requirements in each case, that the result may harmonize in appearance and physiological effect. We have an increasing number of systems of crownwork, but the advance in number appears with few exceptions to follow the line of rapidity in construction, and does not lessen our trouble from either pathological conditions or loss of esthetic appearance about the root crowned. Rather, this multiplicity of systems gives undue emphasis to the mechanics of construction, instead of the ideal sought, causing a certain lack of consideration or bewilderment as to the actual requirements of a permanently useful crown. Ordinarily there is too much speculation as to which system or make of crown

is indicated, and not enough thought as to the essentials required by the individual; too much supposedly rapid technique, and not enough tooth anatomy, especially that part relating to natural form, suited to the individual esthetically, and to the supporting tissues hygienically.

As before mentioned, imperfect cervical outline may be due to any one of several causes, the most frequent being irregular foreign material about the neck of the tooth. This foreign material is of two kinds, namely, calcic deposit and mechanical misfits, and the latter, causing change of cervical outline, may be either too large a band about the root, or too little contour immediately above cervical outline, or both.

Now, the most puzzling pathologic condition confronting us in daily practice is often referred to at its beginning as a slight in-

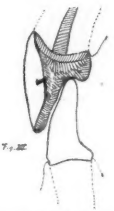


Fig. III.—Mesial view, showing adaptation of Richmond crown to facilitate retention of position of upper anterior roots, applicable where there is interference by partial plate or where there is need of anterior masticating surface.

flammation of the gums, and at a time when our earnest effort is given to the removal of calcic deposit, to alleviate or cure this condition, it is certainly highly inconsistent to place a crown having a band so poorly adapted that it is as irritating as a like amount of such deposit; or a crown lacking contour sufficient to protect the cervical margin from laceration and forced recession by passing food. To emphasize this, let me again call your attention to the circulation of these parts, in which that of the gum, the periosteal and peridental membranes is continuous, showing that a chronic inflammation of the gum cannot but affect destructively the deeper tissues.

Each individual is given teeth varying more or less in form from those of all others. This variation is in a few cases very slight, but close similarity is not frequent enough to justify us in ignoring the requirements of natural form in any case. In addition to the variations of form and color, we have those of position and condition,

which make it imperative that our methods of crown-making shall be elastic enough to meet them. The types of crowns most nearly meeting these requirements are the Richmond, the Banded Porcelain and the Seamless Gold Telescope, as these three permit the largest range in selection of form. In each the first step is the placing of the narrow band which gives the greatest accuracy of adaptation about the cervical portion of the root, and each permits and invites the reproduction of the gingival ridge where we have the greatest labio or bucco-lingual diameter of the tooth, giving protection to the gingivæ and preserving the cervical outline. The adaptation of the band is greatly facilitated by proper preparation of the root, where in all cases, from below the cervical line crownwise, the converging sides must be reduced sufficiently to admit the band within the former circumference of the enamel.

If the root be for a banded porcelain crown, made with a facing, it should be cut off as close as need be to the cervical line, and with the same curvature, slightly accentuated at the labio-gingival angle, after which the end between the mesial and distal sides should be made concave, giving a trough-like appearance across the end from labial or buccal to lingual. This concave reduction gives added space where most needed for bulk of porcelain, and secures a much firmer seat for crown. If the root be for a Richmond the concave effect is not required, and if the crown be for a bicuspid it is best if possible to leave the lingual portion of the tooth long enough that it may extend into the crown for retention instead of inserting a post.

If the crown be a shell the root requires no particular preparation as to form, other than the required reduction of the converging sides from below the cervical line crownwise. Unless the natural tooth has been malformed or malposed the prime requisites of a crown are as follows: It should occupy as nearly as possible the same form in space upon the root as did the natural one, restore the functions of mastication and speech, give adequate protection to the supporting tissues, and restore the esthetic appearance of the features.

The band, if any, should flatten to a thin, round edge, and assume in space tightly the same curve and position over the alveolus as formerly occupied by cervical border of enamel, giving practically an uninterrupted surface. Any part of the band allowed to extend

noticeably deeper or away from this position becomes an irritating factor, as would a deposit of calculus of like size in the same position.

The crown should rest firmly upon the root, protect the cervical outline, and harmonize with the other teeth in form, outline, position, articulating surface, occlusion, and if possible color, restoring the expression and esthetic appearance. It should have its full share of overhang in the perpendicular from the neck outward all the way round, as is typified by the increased diameters of the natural crown over the diameters at the neck, as mentioned in previous paragraph.

These requirements can be most nearly met by the above-mentioned types, wherein the large range in selection of form permits close conformity to nature. The Richmond crown has some

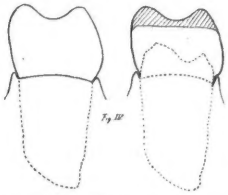


Fig. IV.—Mesial view, showing outline of natural crown, also seamless crown adapted to same root.

adaptive features (Fig. III) peculiar to it alone, as in the case of a loose or weakened anterior root, where the lingual lobe may be extended into a shoe or cusp, occluding back of the lower incisors, thereby keeping the root in perfect alignment, and if the bite be also a hard, shearing one, a backing reinforced over occlusal third by clasp metal gives a crown in strength every way substantial and satisfactory. This clasp-metal reinforcement holds good for all Richmond crowns, but in normal conditions, or where the bite is end to end and not short, the banded porcelain crown, constructed with intent to preserve the true cervical outline, is the acme.

The seamless crown method permits a very close reproduction of natural tooth form. The mold in which it is made is in each case a specially prepared instrument, insuring characteristic individuality beyond that of any other plan for all-gold crowns. Other methods may be equal in securing mesial and distal contact and occlusion, but no other gives the same exactness in form variations, and no

other equals this in securing the esthetic reproduction of the bucco-gingival ridge, and the lingual swell and pitch of molars and bicuspids. (Fig. IV.) No other so uniformly permits the reproduction of desired fullness on the lingual at disto or mesio-occlusal angles, preventing packing of food upon the lingual half of gum septum.

It is true that this method takes a little more time, but it is fully warranted by the superior results obtained. The strength is equal to the requirements of any telescope crown, a 30 gauge gold thimble, with diameter at neck equal that of mold being used, prevents appreciable stretching or thinning of gold at points other than those which it is desirable to reinforce. The measurement about the root is taken with a 30 gauge aluminum band cut down narrow, buccally and lingually, and owing to this narrowness and the softness of the material it may be adapted with the greatest accuracy. The measurement and adaptation thus secured are taken from the mouth with a bite in modeling compound, which is poured, giving a plaster model of the parts with band in relative position. Upon this model and band a plaster model of desired tooth form may be built and carved, and afterward pressed into some hard yet easily fusible alloy, suitably contained, using pressure enough upon the molten alloy to secure a sharp mold wherein gold thimble is swaged. By this method the correct measure and accurate adaptation secured are not disturbed—are scarcely touched—until the mold is made tightly around them, giving almost automatic accuracy where needed; combined with the greatest range in tooth form suitable to the characteristics of different individuals and conditions.

I have endeavored to show that natural tooth form, having an uninterrupted cervical adaptation, with protective contour sufficient to retain the normal cervical outline, underlies and simplifies the art and construction of permanent hygienic and esthetic crowns. In short, the cervical outline is the scientific base of all operations for construction of crowns. When you have determined upon its position and preservation, you cannot go far wrong at other points.

Discussion. *Dr. R. N. Lawrance,* Lincoln: I call to mind two cases illustrating the influence of tooth form in the final results in the treatment of pyorrhea. The first I treated two and a half years ago. The principal bad features were the immense pockets and cavities between the first and second lower molars. After proper

treatment of the pyorrhea pockets I filled out these teeth in such a manner that the tooth form was an exaggerated outline, and built it out until the interproximal space was occupied by the filling and protected by an arch which prevented the lodgment of food. The parts are now normal and the patient is in comfort. The second case was that of a lady with pyorrhea extending over most of the teeth. She had two shell crowns on the upper second bicuspids, there was no contour, and they were loose. I succeeded in curing the pyorrhea except in those two teeth, so I removed the crowns and contoured them out in exaggerated form until the interproximal space was protected. I used iodid of zinc and massage, and the parts to-day are healthy and normal.

Dr. Eugene S. Talbot, Chicago: From the mechanical standpoint this paper is excellent and cannot be criticised. There are two sides to dentistry, however, the mechanic and the pathophysiologic. The mechanic phase of dentistry has been overdone. All mechanics are limited, and this is particularly true of dental mechanics. Narrow training impels the student to expect too much of the teeth and to rush pellmell into operations without considering the pathophysiologic side or what strain jaws and teeth can stand. The essayist has selected one of the easiest cases in the mouth for demonstration. The mechanic would merely ask, is this a workable model? Can it be applied to all conditions in the mouth? The working scientist would reply, while that is true from the mechanic side it is not workable from the physiologic.

Twenty-five years ago a wise mechanic who traveled from the West towards the East stopped by the wayside and imposed on dentists his method of gold crown application to tooth roots. The root was prepared and the crown driven under the gums as far as and sometimes into the alveolar process. This method was practised for many years. Later, because of the excessive pain produced, the crown margin only was carried under the gums, in order to protect the neck of the tooth from decay. This practice has been continued to the present time despite the notorious fact that for the past two decades many teeth thus treated have been removed with the fingers with the roots attached.

A little later another wise mechanic traveled from the same city in the same direction to demonstrate his method of restoring the alveolar process, peridental membrane and gum tissue in so-called

"pyorrhea alveolaris" by the delicacy of touch and the application of acids. Strange as it may seem, no one in this particular part of the country possessed, from his viewpoint, this "delicacy of touch." It has, however, been acquired by a few dentists in Illinois and especially in Chicago within the past few years. The most interesting thing is that such acquired delicacy of touch will cure interstitial gingivitis due to Bright's disease, indicanuria, chronic constipation, intestinal fermentation, skin lesions, tuberculosis, Dercum's disease, asthma, autointoxication and drug poisoning, in short, all cases of "pyorrhea alveolaris." This wise mechanic can transplant and implant teeth into the alveolar process and guarantee success even with teeth removed from a mummy 2,000 years old. There are still men who claim to do these wonderful operations. In Chicago there is a man, entitling himself M.D., D.D.S., who can, according to his advertisements, restore all lost dentition by his wonderful alveolar method. All this in total defiance of physiology. The alveolar process has never been constructed to hold more than one crown at a time. Indeed, in the order of evolution and the transitory nature of the alveolar process, it has as much and often more than it can do to hold one crown and root.

To discuss the pathologic phase of the question fully time will not permit, hence I shall confine myself to the alveolar process. With the validity of the first sentence of the paper rises or falls the essayist's entire argument: "In perfect physiological conditions, around the root of a tooth, from apex to enamel border or gingival line, is the peridental membrane, and its function is to nourish and retain the root in its bone-like socket." Just what does this mean. If he infers that "perfect physiological conditions" mean the peridental membrane while the alveolar process is growing about the permanent teeth, I agree with him. If, however, he means that there is a perfect physiologic peridental membrane and alveolar process, after the alveolar process has obtained its growth in a majority of cases, his position is untenable. It is at this time that crowns are adjusted. I would like an explanation of how the peridental membrane nourishes the tooth. This is important, since some mechanics destroy pulps to cure interstitial gingivitis.

The essayist says, "Whenever the free margin loses its natural outline and form we have a disturbed unnatural effect, the harmony of the teeth with their surroundings is broken, and a sense of

loss and confusion prevails." Again he says, "In other words, the gum when protected in the interproximal space stays there in good health and does not recede." Is this position well based? The later trend of the paper is to show how crowns may be applied throughout the mouth to prevent gum irritation. This brings up the entire subject of the pathology of the alveolar process.

Before taking up the pathology of the alveolar process, the physiology and nature of the structures under discussion must be studied. In his evolution man, as shown by embryogeny, has undergone many changes. Structures have been added, others lost. From Thales to Darwin scientists studied these changes to formulate a law governing this process. Empedocles, 495 B. C., outlined the doctrine of evolution, including the survival of the fittest. Aristotle, 384 B. C., cleared up the relation of the structures and organs to each other from the standpoint of the law of economy of growth to benefit the organism as a whole. Later Goethe in 1809 and St. Hilaire in 1818 pointed out more clearly the obscurity of this law. Under same, the face, nose, jaws and teeth are being lost for the benefit of the brain. These structures are therefore transitory. Because of readjustment the alveolar processes are growing smaller and thinner. Again, man has but two sets of teeth. When the crowns have become calcified and the roots have begun to take in calcific material, absorption of the border of the process takes place in the order of eruption of the teeth. When the teeth have erupted the alveolar process develops downward and upward with the teeth until it attains the depth of the roots, which in most instances extend into the superior maxillary bones in the anterior part of the mouth, and the upper and lower teeth rest at a point in harmony with the rami. The depth to which they penetrate depends upon the length of the roots and the alveolar process, and this in turn depends upon the length of the rami. The incisive fossa, the cuspid eminence and fossa, give evidence of this externally. The sockets are lined with extensions of the process, thus making its upper border irregular.

When the temporary teeth are shed the alveolar process is absorbed to make room for the eruption of the permanent set. The crowns of these, being larger than those of the temporary teeth, require more space and the process must enlarge to accommodate them. It is then rebuilt about the roots of the teeth on a much larger

scale. When the temporary teeth are lost the alveolar process is resorbed. It is hence developed twice and absorbed twice, provided the second set of teeth be lost. The process is a thin, unstable structure well nourished with blood vessels. As the skull and brain are gaining in the struggle for existence at the expense of the face and jaws, the jaws with the alveolar process must decrease in size with advancing development. This tendency and the changes just described render the process doubly transitory. It is therefore the most sensitive structure in the human body. In treating a patient for syphilis, for example, mercury is given until the gums "are touched." Why not look for other symptoms showing the system has been saturated, unless the alveolar process and gums, being the most sensitive and transitory structures, are the first to become involved? Again, when a man presents himself to his physician for treatment one of the first questions asked is, "What is your business?" If he be a metal or drug worker the physician first examines his gums for like reasons.

Many vertebrates have a succession of teeth throughout life. From an atavistic viewpoint, if man lives long enough he will lose his second set even if he remains in a fairly normal condition. The teeth are virtually foreign bodies in the alveolar process, and the latter is an end organ, hence the anatomic relation between the two makes it very susceptible to disease.

As soon as the alveolar process has obtained its growth about the second set of teeth, because of its exceedingly transitory and sensitive nature, some slight irritation may set up an inflammation to destroy it. This slight irritation is usually an autointoxication due to a want of harmony of action in the eliminating organs, faulty metabolism and disease. Nearly every person over twenty years old has this disease. I have called this inflammation interstitial gingivitis, since it is deep-seated as well as superficial. When inflammation takes place in the alveolar process an absorption immediately follows, called osteomalacia or senile atrophy because it continues until the second set is lost or the patient dies. Bone absorption is brought about by halisteresis, Volkmann's perforating canal and lacunar or osteoclast absorption. If interstitial gingivitis and osteomalacia be normal in the alveolar process, it is obvious it will proceed more rapidly if the irritation, whether local or constitutional, be increased.

This irritation may start at the gum margin from tartar, a gold crown, food, or any irritation, and extend into the alveolar process, or it may be due to an irritation (toxic elements) in the blood stream, such as results from bacteria, autointoxication or drug poisoning setting up an inflammation in the alveolar process. Wedging teeth for filling, regulating them, the process of shedding the temporary teeth, the eruption of the teeth, absorption of the alveolar process after extraction, drilling cavities in the alveolar process to insert foreign bodies, such as implanting teeth, the extraction of a tooth in a normal jaw with a normal set of teeth, all tend to increase the irritation, inflammation and absorption. Persons who have suffered from ptyalism have the disease.

Why not carry the gold crown down to within a line of the gum margin, and thus prevent local irritation and avoid absorption which is sure to take place and expose the neck of the tooth and set up an interstitial gingivitis. It is questionable how far dentists are warranted in wedging and regulating teeth, and implanting or transplanting them in the mouths of people who are suffering from disease, autointoxication or drug poisoning. While the alveolar process is developing (up to the twentieth and in some cases the twenty-fifth year) it is possible to perform most operations. After that period the older the patient the less the chances of success. When the trabeculæ are once destroyed osteoblasts cannot build up bone, hence the non-restoration of the process. For like reason, the roots of temporary teeth with abscesses are not absorbed when the permanent teeth erupt.

THE ADVANTAGE OF ORGANIZATION.

BY C. R. E. KOCH, D.D.S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

The pages in Nature's library abound in evidences of the advantage of organization. Molecular and atomic existence in the inorganic and organic world alike becomes useful and recognized only through aggregation, association and organization under well established laws. These remove entities of obscurity, weakness and uselessness into bodies of recognized strength, importance and utility.

The great floating engines of peace and of war, the modern leviathans of the seas, are splendid examples of the advantage of or-

ganization. Their interdependent and independent parts, their complicated machinery, their delicately adjusted electric and astronomic apparatus, are all so coordinated as to make one harmonious whole. These are conceived by genius, designed by scientifically trained minds, and constructed by hands skilled in the arts and by labor always responsive to the requirements of the world's progress. Genius, science, art and labor would be very much circumscribed in their achievements if they were deprived of the advantage of organization.

The great ships which we have chosen as an illustration, with all their grand structure, their intricate mechanical devices, their magnificent equipment for the purposes of their creation, their powerful searchlights capable of revealing the unseen and unknown hidden by darkness, remain simply a mass of inorganic matter—as useless, as weak, as passive as are the products of Nature's creations from the laboratories of which their materials came. To give them life, activity, puissance and usefulness the further organization of a human machine is necessary for advantageous results. The captain on the bridge, the pilot at the wheel, the engineer at the throttle, the fireman and stoker in the pit, the cook in the galley, and all others at their proper stations are needed, each harmonious with the others, in order that the grand mechanism shall reach the highest advantage that organization can secure.

When the thirteen colonies of these United States coalesced into this nation of ours they took advantage of the greater usefulness and strength that comes of organization. They epitomized and emphasized this central idea by adopting the motto that is still emblazoned upon its escutcheon: *E Pluribus Unum.*

The progress, achievements, activities and accomplishments of associated workers in the fields of labor, commerce, industry, statesmanship, diplomacy, yes, even of partisan politics, all proclaim the advantage of organization, forming a machine, if you please. The general proposition that organization is advantageous may thus be considered as self-evident and further elaboration to illustrate it is unnecessary.

There are those within this audience who were members of the dental profession before there was much of an organization in it. These I am sure would unite their testimony to the effect that what-

ever position of vantage our calling now has in the world is due to the associated effort in organization of the better men belonging to it—the men who had higher aims and aspirations for it and for themselves than to form purely a trades union for personal or professional or financial gain. While we are compelled to admit that much has been accomplished in this way, there is still a great field of unexplored possibilities, with a promise of a rich harvest under the advantage of well planned and intelligently executed organization.

Years ago the Illinois State Dental Society, with a view to bringing into closer contact with organized effort a greater number of the individual dentists of the state, planned and executed the organization of a number of independent but affiliated societies in various portions of the state. While these societies have done good work, it seems to me the aim and effort should now be to enlist within the fold and sphere of this associated effort for improvement every one who practices dentistry intelligently. These would give and take, and the exchange would profit the profession and would benefit mankind, but how to accomplish this is a weighty question. The young man seems to fear that he may dwarf in the presence of the seniors, and the man from the rural districts seems to shun the possibility of being outdone by his fellow from the city's throng. The possession of self-consciousness seems to keep many from getting the advantage that they might derive from the organization. The fact still remains that he must be very poor indeed who cannot enlighten and help his neighbor in some particular, and no one is so rich in knowledge and skill that he may not increase them by accepting another's contribution.

The world at large looks upon numbers as conclusive. If the greater portion of a calling keeps aloof from taking part in its associated effort, the right of those who think and act and labor for it is sometimes questioned by the laity as presumptuous and unwarranted. Legislators are swayed by the idea of majorities, and they do not look kindly upon what they consider self-constituted assumption by minority representation. In spite of all these facts much progress has been made.

There is great need that more shall be accomplished in the field of scientific research in the basic principles upon which the profes-

sions of dentistry, medicine and pharmacy rest, and an organized effort of all of them operating with a common purpose would undoubtedly result in great good. The matter of education in these professions and the matter of legislation regarding their pursuit could be much bettered if advantage were taken of the power of organization. To accomplish this there is absolutely no need that one shall swallow up the other or that either of them shall lose its identity. They were once all embraced in one calling, known as the guild of barber surgeons, and there is no good reason why at this advanced state of the world's progress they might not establish such relations of cordial interchange and cooperation as to make each helpful to the other, so that all of them might obtain the advantage of serving human needs and relieving suffering to a more comforting extent.

The field of research, discovery, invention, and the more humble routine of daily practice in the special field of the dentist does not rest by any means upon exhausted soil. While in this individual effort must of course be mainly relied upon, there is no doubt that the fertilizing influence and advantage of organization which stimulate the activity and energy of individuals are of immeasurable advantage. The education of the masses in sanitation, which includes the care of the teeth, affords a field for the united effort not only of the dental profession but for that of medicine in unison with it.

In the realm of professional dental education great advantage may be obtained by better organization, not only by the schools themselves but also by calling into use the latent potentiality and dormant thought of the profession. This would stimulate the schools to higher aspiration by the guaranteed support of the lay members.

The matter of legislation is one that alone is worthy of much thoughtful, well-matured and well-organized action. This is a field worthy of careful cultivation. Science and art have a language of their own, they do not belong to any country or section of a country. Knowledge in one or skill in the other possessed to a certain standard degree should deserve equal recognition the world over. There should be reciprocity in these, even more freely exercised among civilized peoples than in purely commercial commodities. They are cosmopolitan and in this enlightened twentieth cen-

tury should be allowed to roll on unchecked by border lines of countries, leaving their influence, impress and beneficence upon all who come within their sphere. Certainly state lines of one common country, with one common legal language, one in interest and policy, have no right in reason to hamper and curtail by contradictory enactments the free exercise of vested rights, based upon knowledge and skill, conceded in one state, by the laws of another. The right to do so in law does not appear to have ever been challenged.

The United States expended a wealth of treasure and rivers of blood and a half million of lives to establish the principle that it is a nation, and that its decrees are and must be supreme within its own border. It has more recently established the fact that its decrees and wishes have great potentiality among the other nations of the earth. To be a citizen of the United States constitutes one a citizen of any of its component states, subject to local time qualifications only. A citizen of one state is perfectly free to enter into business in any other state. Absolute freedom to citizens of one state to sell goods to those of another state exists. These general rules are not operative when the exercise of the calling of the dentist comes in question. This, like that of the physician, pharmaceutist and some other pursuits, has been considered as subject to a police regulation which is relegated and reserved to the control of the several states under the laws of the United States. These various states and territories have proceeded to put all sorts of fences around their particular reservations, some of them grotesquely picturesque in design and construction, others finely polished and of well constructed phrase. Nearly all of them appear to be built with a view of keeping poachers from the other reservations from entering the local preserve with anything like ease.

Organization cannot hope at once to remedy the jumble of contradictions and restrictions in state laws by a national enactment, but it can and will in time educate public opinion, which in the civilized world is the motive power that inspires law-makers, to bring about such a change in the local laws as to make the conditions for the pursuing of professional life and particularly the pursuits of the healing art nearly uniform throughout the length and breadth of the land. If the power and advantage of organization are appreciated and cultivated the time will surely come when one holding the right of calling himself a doctor of dental surgery in Wisconsin

or Illinois, and of practicing this profession in these states, shall thereby be authorized, like the citizens in other avocations, to follow his chosen pursuit wherever the American flag displays its beauteous folds as the national emblem. This recognition when well deserved at home will go equally unchallenged abroad. The comity of nations will establish the principle that science and art are unlimited by any clime or country, and that one versed in the former and skilled in the latter, with proper credentials vouching for this fact, shall be as unrestricted in foreign lands from practicing his calling and using its well-earned title as are those born and educated at home possessing the same talent or qualifications.

REORGANIZATION OF THE ILLINOIS STATE DENTAL SOCIETY.

PRESENTED BY THE COMMITTEE APPOINTED BY THE ODONTOGRAPHIC SOCIETY OF CHICAGO, ARTHUR D. BLACK, CHAIRMAN, G. WALTER DITTMAR, FRED W. GETHRO. READ BY ARTHUR D. BLACK, D.D.S., CHICAGO, BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

It is hardly necessary, in presenting a plan for the reorganization of our society, to call your attention to the fact that this is essentially an age of organization and reorganization. The rapid advance that has been made during the past twenty years in almost every line of work has made it necessary that there be radical changes in methods. The changes that are being made in the educational system of the country are no less radical than those in the business world. The necessity for better organization of the professions has gradually grown until the time has arrived when we must make changes in our methods of society organization and work or fall behind in the race of progress. The medical profession of this country has been active in the work of reorganization for a number of years and what it is accomplishing is really wonderful. Many states have been organized, many more are in the process now, and all on the same general plan. During the past four or five years the Illinois State Medical Society has pushed the work vigorously, and has in that time increased its membership from about six per cent to over forty per cent of the practitioners of the state. Where it had a membership of a few hundred five years

ago, it now has nearly five thousand. We believe the time has arrived when the dental profession must take up this work, and we should like to see Illinois set the pace for the other states. This committee therefore takes pleasure in presenting the following resolutions passed by the Chicago Odontographic Society on March 21, 1904:

WHEREAS, The best statistics that we are able to obtain indicate that not more than thirteen per cent of the dentists practicing in the state of Illinois are members of the state dental society, and since there are many reasons why a much larger percentage should be enrolled upon the books of our societies, and

WHEREAS, We have noted the fact that the Illinois State Medical Society has enrolled almost half of the medical practitioners of the state by an energetic campaign of organization, therefore be it

Resolved, That the president of the Odontographic Society be instructed to appoint a committee to present this matter to the attention of the Illinois State Dental Society at its annual meeting, and request that that Society take up the work of organizing the dental profession in this state on lines similar to those followed by the state medical society, and be it further

Resolved, That the Chicago Odontographic Society offer its services to the Illinois State Dental Society in carrying out the work of organization in Cook County.

In order that these resolutions might receive proper consideration by this society, the committee considered it a part of its duty to present: first, the plan of organization of the Illinois State Medical Society; second, a few statistics showing the conditions prevailing in the dental profession of this state with regard to society membership; third, the probable benefits to this society, to the district and local societies, and to the profession and the public, that would result from such a reorganization, and fourth, an outline of the work necessary to effect such a reorganization.

The present organization of the Illinois State Medical Society. The membership of the state medical society is composed entirely of practitioners who are members of local or "component" societies. A man cannot be a member of the state society until he has been elected a member of the local society in the county in which he lives, and in joining his local society he must at the same time become a member of the state society. The plan includes the organization of a local society in each county in the state. Each local society has

charge of the work of organization in its own county, and it endeavors to get every reputable practitioner to join. By this method the qualifications of each member of the state society are passed upon by the men of his own county, who are best able to judge of his fitness for membership. If at any time a man who is a member of his local and the state society should become an unethical practitioner, the local society can drop him from its membership, and from then on he is not entitled to membership in the state society.

Whenever a county society adopts a constitution and by-laws that are in accord with the constitution of the state society a charter is issued to it, making it a component part of the state society. A month or two before the meeting of the state society each year the secretary of each of these component societies sends in a list of members, and these lists constitute the membership of the state society for that year. Each member pays his dues to the secretary of his local society, and a certain portion of this is forwarded to the state society, so that each man pays his dues covering both his local and the state society to the local secretary, and the secretary of the state society collects the dues from the secretaries of the various local societies.

In addition to the county societies, of which there are now ninety in this state, almost one for each county, there is a provision for district societies, so that a number of adjoining counties may organize a district society if they so desire.

The state medical society is purely a delegate association. It has an executive council of nine members, the duties of which are similar to those performed by the executive council of this society. The legislative body, which is known as the house of delegates, is composed of delegates elected by each local society, the number from each being in proportion to its membership. This house of delegates transacts all the business, including the election of all officers, that is done in the full meetings of the state dental society. By this arrangement the entire business of the society is transacted by men especially appointed to do that work, and the majority of the members are not required to lose so much time from the papers and other scientific work in which they are more interested.

We should say here that the plan of reorganizing this society, which has been presented in the proposed amendments to the constitution, does not include the adoption of the house of delegates, as that would hardly be necessary until our membership has been con-

siderably increased. The plan proposed at present covers only the organization of local societies as component parts of this society, and the requirement that a man must be a member of his local society in order to be a member of the state society.

Statistics showing condition of the dental profession of the state. It has been the endeavor of this committee to collect some statistics which will give a fairly accurate idea of the number of dentists in the state, and of the membership of the various dental societies. There are no accurate statistics obtainable as to the number of practitioners in the state. The last edition of Polk's Directory, 1902-03, gives about 2,300. The state board of dental examiners places the total at about 3,200, which figure is probably more nearly correct. However, we have been compelled to take the list in the directory, as the most accessible basis upon which to work. In obtaining names of the members of the various societies in the state we have found about two hundred who are not included in the last directory, which fact alone shows that there must be several hundred more practitioners, and we think the total number could be safely placed as high as 3,200. We have taken the names as printed in the directory, together with those we have been able to add, and have transferred these names to a card index, with all of the dentists of each town on one card, and the cards of all of the towns of each county together. From these we have been able to make summaries of each county separately. In Chicago we have arranged the dentists of each of the large office buildings in separate groups, and have then divided the remainder of the city into districts. We have written to a number of members of the state society in the larger cities of the state, and have secured the names of the members of the various district and local societies. We have endeavored to make this list complete, but we may not have the names of all of the local societies, and if there are any others we should be pleased to have them reported at the meeting. On these cards we have marked after the name of each man the society or societies to which he belongs. A majority of the members of the state society are members of some local or district society also. Quite a number are members of three—local, district and state societies. From these cards we have been able to make up some statistics which give a good idea of the conditions that confront us. Out of 3,200 practitioners in the state we have 368, or less than twelve per cent,

enrolled on the books of the state society. Is it any wonder that our politicians do not favor a law which gives twelve per cent of the practitioners of the state the right to name sixty per cent of our state board of dental examiners? There are thirty-two counties that have no member in any dental society, state, district or local. There are forty-four counties that have no member in the state society. There are ninety counties that have no local societies. There are forty-three cities, each having five or more dentists, that have no local societies. I wish to read a few of these from the list.

County.	Number of Dentists.	Members of State Society.
Adams	30	5
Alexander	9	0
Bureau	15	1
Christian	13	0
Clark	10	1
Coles	16	2
DeKalb	16	1
DeWitt	10	2
Dupage	13	0
Fulton	20	3
Greene	12	2
Grundy	10	2
Hancock	20	2
Iroquois	11	2
Kane	54	5
Kankakee	19	0
Knox	30	2
Lake	15	3
Lee	14	2
Logan	15	2
McHenry	21	1
Macoupin	16	3
Marion	8	0
Marshall	8	0
Montgomery	11	0
Piatt	11	2
Pike	11	2
Randolph	12	0
Rock Island	31	4
St. Clair	24	0
Stark	9	0
Tazewell	17	3
Vermilion	30	3
Warren	13	3
White	9	0
Whiteside	24	0
Woodword	11	2
Thirty-seven counties	618	60

City.	Number of Dentists.	Members of State Society.
Aurora	18	1
Belleville	9	0
Cairo	9	0
Danville	20	3
East St. Louis	12	0
Elgin	18	1
Evanston	15	3
Galesburg	23	2
Kankakee	10	0
LaSalle	5	0
Moline	10	2
Oak Park	10	2
Ottawa	11	1
Quincy	23	4
Rock Island	17	2
Fifteen cities	210	21

In Chicago we find that in nine of the large office buildings, in which there are 299 dentists, 84 are members of the state society, while in the remainder of Chicago and Cook county there are 935 dentists, of whom only 68 are members.

The following counties have local societies—

County.	Number of Dentists.	Members of State Society.	Members of Local Societies.
Champaign	24	8	10
Jo Daviess	19	3	17
La Salle	46	11	8
McLean	48	16	27
Madison	24	7	..
Morgan	14	7	7
Peoria	42	13	23
Sangamon	38	14	19
Stephenson	25	7	18
Vermilion	30	3	12
Winnebago	34	9	19
Eleven counties	344	98	160

In Cook county we have combined the membership of the three societies, Chicago Dental Society, Chicago Odontographic Society, and Englewood Dental Society, and after eliminating duplicates (men who are members of more than one local society) we find that of the 1,234 dentists in the county 152 are members of the state society, and there are 467 members of the local societies.

There are three district societies in the state—

First District Dental Society, with	73	members.
Northern Illinois Dental Society, with	138	"
Southern Illinois Dental Society, with	50	"
Three district societies	261	"

Of the 160 men who are members of the local societies outside of Cook county, 92 are not members of the state society. Of the 467 members of local societies in Cook county 366 are not members of the state society. This gives a total of 458 local society members who are not members of the state society. Of the 261 members of the three district societies 126 are members of neither the state nor any local society. This gives a total of 584 society members in the state who are not members of the state society.

It seems to us that these statistics show very clearly the need of a reorganization of the dental profession of this state, and we feel that this society could not do better than adopt the plan which has been carried out so successfully by the state medical society. It has spent several years of hard work in perfecting same, and by adopting it we can save many mistakes and delays.

The probable benefits that would result from such a plan of reorganization. What would be the effect of such a change on the membership of our state and local societies? As the statistics show, if we should be able to bring into this society all of the men who are now members of the various local and district societies of the state it would increase our membership from 368 to 952. If we add to this those to be taken into the Chicago Odontographic Society at its next meeting the total would be 1,081. We believe that if the proposed amendments to the constitution and by-laws, including a material reduction in the dues of this society, are adopted, and the work is pushed vigorously, all of the existing local societies will join in the movement. We think very few of the men in these societies will withdraw, and feel that we can safely count on the addition of three hundred names from this source. We could secure the 126 men in the district societies, who belong to neither the state nor a local society, only by the organization of local societies in the counties in which they live. The statistics show that there are several of these counties well represented in district societies, with but few members in the state society, as follows:

County.	Number of Dentists.	Members of State Society.	Members of District Societies.
Kane	54	5	23
Knox	30	2	14
McDonough	15	5	9
Ogle	16	4	6
Rock Island	31	4	10
St. Clair	24	0	11
Warren	13	3	8
Whiteside	24	0	5
Will	31	7	14
Nine counties	238	30	100

We believe that the organization of local societies in these counties would increase our membership at least one hundred, and

we should be able to add enough more in other counties to make our membership from nine hundred to a thousand a year hence. So much for the possibilities in increasing our membership. If we could do this much during the coming year we would have the work of reorganization fairly started.

Under the new arrangement, by which each local society would be an integral part of the state society, there would exist a much closer relationship, which would surely be beneficial to both. Our ability to secure legislation would be increased many fold, and we would have an effective organization which would be valuable in all work for the public good. The state medical society is willing and anxious to cooperate with us in all such matters, and we would be better able to claim their cooperation and render them assistance. We would soon be in a position to give our state board of dental examiners much assistance in the location and punishment of illegal practitioners. The scientific work of this society would be of a higher grade, because the various committees would be able to locate more easily the men who are doing interesting work. For example, the program or the clinic committee could ask each local society to suggest the names of men who could give interesting papers or clinics, and in this way we would get men who would represent the work that is being done in the various sections of the state. As the matter stands now, it is very difficult for the chairman of such a committee to locate men, outside of his personal acquaintances, who should be invited to take part in the program. The same advantage would apply in all of the departments of our work.

One benefit, not to be overlooked, is the opportunity offered by this plan of keeping the membership of this society clean. While our constitution provides that the members must be ethical practitioners, and while all candidates may be ethical and good when they join, we have not the means of knowing from year to year whether or not all of our members are living up to the standards set by our rules. It is true that we have a committee to consider such cases as may be reported, but the fact is that they are rarely reported. We have a letter from the secretary of one of our local societies calling attention to a man who joined the state dental society last year and immediately afterward began to advertise on a large scale. What would happen to such a man under the proposed plan? The

local society of which he was a member could instruct its secretary to refuse to accept his dues for the coming year, and he would by that action be dropped from the membership of both his local and the state society. Every man's actions must be acceptable to the men of his local society or he loses his standing in the profession.

Another distinct advantage to the local societies has been suggested by a letter received from the secretary of one of them, proposing that in connection with the meeting of the state society there should be a meeting of the representatives of each local society, to discuss plans of work, program, methods of obtaining members, and matters of general interest to local organizations.

The greatest benefit to be derived by the district and local societies would be from the closer relations that would exist and from the increased interest that the men of these societies would take in each other. We believe the standard of work done by each of the local and district societies would be higher.

An outline of the work necessary to effect such a reorganization. The first step in carrying out such a plan of reorganization would be to have a committee, composed of men from as many counties in the state as possible, organized to carry out the work. It would be necessary to obtain a correct list of practitioners in the state by counties, and after this has been done, it should be the endeavor to get all of the local and district societies to make such changes in their constitutions and by-laws as are necessary to make them conform to the constitution and by-laws of the state society, in order that they might apply to our executive council and receive charters making them component parts of this society. Wherever the local societies as now organized are "city" societies they should be changed to "county" societies. If we did no more during the coming year than obtain the membership of the existing local societies, we would more than double the membership of this society and increase its effectiveness in equal proportion. As rapidly as possible other counties, in which no local societies now exist, should be organized on the same plan as that carried out by the state medical society.

According to the proposed amendments, the executive council may make special provision for the membership of individuals in counties that are not organized when this plan goes into effect. This means that in all unorganized counties the rules governing

membership would be practically the same as they are now. A committee appointed by the executive council would receive and pass on all applications from unorganized counties, and members would be accepted directly, as they are now. As each county is organized the right to pass upon applications for membership from men in such counties would pass from the state to the local society. If the proposed plan is adopted, and all of the existing local societies become components of the state society, there would at present be twelve counties (which have local societies) in which men would have to apply to the local society in order to join the state society. In the other ninety counties the conditions would be the same as now. Applications from them would be received by the state society.

It might be interesting to refer very briefly to the method by which this work of organization has been carried out by the state medical society. The first effort was to induce all of the previously organized local societies to become a part of the state society. After this had been done the state was divided into districts and a man was appointed to take charge of the work in each. These districts were then organized county by county until almost every county in the state had a local medical society. It was found that there was in many counties some friction or rivalry between two or more factions, which prevented them from getting together and forming a society. In such cases the district organizer called a meeting of all of the practitioners of the county and was generally able to persuade them that they should overlook personal feelings and organize a society. When an outsider made such a proposition to the practitioners of a county it was much easier for them all to agree to it than if it had been made by one of their own men. In other words, the district organizer acted as an arbitrator of the differences which existed between the practitioners of each county. How well this plan of organization has succeeded is best shown by the increase in the membership of the state society (nearly 5,000) and in the increase in the number of societies, as there are ninety local and ten district. The Chicago Medical Society alone has over 1,500 members.

In closing, we wish to particularly emphasize one point—that the proposed plan has for its first object the banding together of all those dentists who are already society men, and who are therefore

the best men in the state. When it is proposed to increase the membership of any society from four hundred to a thousand or more, the thought to be given first consideration should be the effect that the increase will have on the value of the work of the organization—whether or not it will be better able to carry out the aims and objects for which it was organized. It is well known that many societies decrease their effectiveness by increasing their membership, because the average of quality among the members is lower. Whenever a society becomes so anxious to increase its membership that it forgets to make careful inquiry into the qualifications of those men whom it invites to join, that society is on the down grade for effective work and the larger its number of members the poorer will be the quality of work, and the lower its standing among kindred organizations. If we cannot increase the effectiveness of the work of this society and of the various local and district societies of this state by the adoption of this plan, we would better not adopt it. We believe you will agree with us that in each city in which a local society exists the men composing that society are as a rule the better practitioners of that community, and men who would make desirable members of this society. There are nearly six hundred such men in this state—men who are members of local and district societies, but who are not members of the state society. The first aim of the proposed plan is to get these six hundred men as members of this society. This committee is of the opinion that they would make very desirable members and would increase rather than decrease the effectiveness of the work of this body. After these men are secured as members subsequent additions would come largely through them. In each of these local organizations we have men of experience in society work, who have knowledge of the history and work of the Illinois State Dental Society, and we believe they can be trusted to be watchful of the best interests of this organization.

HOLLOW POST FOR CROWN AND BRIDGEWORK.

DESCRIPTION OF CLINIC BY GARRETT NEWKIRK, D.D.S., LOS ANGELES, CAL. GIVEN BEFORE THE CALIFORNIA STATE DENTAL ASSOCIATION, AT SAN FRANCISCO, MAY 16-18, 1904.

My clinic was to show the advantages of the hollow post, especially for bridge attachments to cuspid teeth in connection with the inlay (in this case overlay) principle. The post material is made

of clasp metal and is exceedingly strong. I have used it in the manner demonstrated and for all Richmond crowns for nearly twenty years, until recently making the post myself. For attachment of a lateral incisor to a cuspid I am sure this method is the one par excellence. Of course it is applicable only to devitalized teeth. The tooth is saved in its entirety, except that it may be necessary occasionally, not often, to grind a little off the lingual face to allow for occlusion. This, however, can be often done by a little grinding of the occluding teeth.

The post-hole is reamed out with a round bur to gauge, No. 11 for the 12-sized post, 13 for the 14. A piece of pure gold is cut out, of the general form desired, large enough to cover all the lingual face of the tooth and well over the end, also to extend a little way along the interproximal. A hole is cut at the proper place (I use for this the rubber dam punch) of a size to fit the pin tightly. The uncut post material is passed through the gold and placed with it in position in and upon the tooth. The gold is burnished snug to the tooth about the pin only. They are then carefully removed, touched with a bit of flux at the point of union, and tacked together with a small piece of 20k. solder, using a fine blowpipe. Now replaced, the gold is burnished over, not closely as yet, and trimmed to size and form. Again removed, with small scissors a number of short slits are made along the edges, most upon the occlusal, to make easier the securing of close adaptation. Of course, in tacking the pin and gold together thorough annealing has been insured.

The next step is to cut off the post close down to the attachment, the safest instrument for this being a thin saw. From this forward the piece is handled by a steel instrument with a fine point which is inserted in the hollow of the post. This is far more convenient than a pair of pliers, and it can be used for lifting off the piece from its position on the tooth without danger of disturbing the edges during the process of adaptation.

No attempt is made to make the adaptation of the gold all at once. First one side is burnished closely, fluxed and covered with 20k. solder. Then the other side is adapted, and finally the ends. The result is a snug gold cap that with the post makes a very rigid and safe abutment. There is really no necessity for a long pin, as it may scarcely enter the root of the tooth only in the crown, and the piece will have abundant strength for all the strain that may

come upon it. In the final finish of the piece for cantilever or bridge I usually close the opening in the post by the insertion of a bit of foil to which the solder adheres. The cylinder opening can be readily reached with a sharp bur or drill, should it become necessary to remove the pin or treat the canal beyond.

There are few practitioners who have not had occcasion to remove solid posts from roots, and we all know what that means. The removal of a tube post is a matter of no difficulty. A small round bur may be run through, followed by a larger one, and the pin removed in less time than it takes to write about it.

For insertion of bridge, cantilever or crown, it must be remembered that the post fits the hole all the way and there is little room for cement. It should be therefore not too thick, and slow-setting. An amount should be placed first in the hole in the tooth, the cap surface covered, then the piece goes to place with a perfect joint and the least possible cement lining. I have had a cuspid piece with lateral incisor attachment inserted with a thick solution of gutta-percha, intended to be only temporary, but the patient went away and wore it without change for a year. This was possible because the piece fitted. Many of the pins inserted for crowns and bridges are too small and weak, and the conical ones do not fit and have not the "hold" of the tube. There is also an excess of cement. In many that have come to me for repair or replacement I found that the pins did not half fill the hole in the root. The weak pin was simply imbedded in a mass of porous cement. I would rather trust a pin one-eighth of an inch long, if it fits, than one three times as long that does not.

Still another advantage of the tube post is connected with the final impression. To make sure that the cap and pin come away with the impression, a very small tack or the head end of a common pin may be tightly inserted into the cylinder. This will insure that the piece is withdrawn and sets accurately.

I usually make the adjustment of the tooth or teeth to be attached on wax, in the mouth, in connection with the abutment, and take an impression of the whole. For front teeth hard modeling compound, well chilled with cold water, is the most convenient and perfectly reliable.

For a Richmond crown, or for a short dowel in connection with a molar or bicuspid cap, there is nothing so convenient or more dependable than the tube post.

SEAMLESS CAPS BY A SHORT METHOD—ESPECIALLY INTERESTING TO PORCELAIN WORKERS.

BY W. N. AVERY, D.D.S., SAN JOSE, CAL. CLINIC GIVEN BEFORE THE CALIFORNIA STATE DENTAL ASSOCIATION, AT SAN FRANCISCO, MAY 16-18, 1904.

I claim to here present the shortest, quickest and most simple method yet produced, with more perfect results than have been attained by more roundabout plans. The idea is not applicable in making ordinary caps where the contour and occlusion are to be formed anew, but with some variation is to be used in the following cases: Open-faced gold caps, platinum caps for jacket crowns, full caps for abutments where complete contact is desired on all surfaces of the tooth to be crowned, and last but most important, a seamless cap or ferrule for any combination metal and porcelain crown.

I will first outline my procedure with the jacket crown and the open-faced crown. With the dentimeter twist a wire around the tooth to be crowned at the gingival border. Grind or cut away the tooth until the wire can be slipped off without stretching. For the open-faced crown no grinding should be done on the labial surface, while for the jacket crown as much as possible is generally desirable. Grind the lingual surface according to the amount of reinforcing necessary. Make a copper band of generous width, say ⅜ of an inch, and of the circumference indicated by the dentimeter. Trim and fit this band to the gingival border and remove from the tooth. With plaster mixed thin fill the copper band and press to place on the tooth, holding the finger over the open end of the band. Drying may be hastened by holding pieces of cotton against the exposed plaster. After allowing the plaster to become quite hard the impression may be easily removed with no danger of fracture. After drying, about this banded impression form a paper tube extending an inch or less from the gingival border. Fill the paper tube and impression with low-fusing alloy. You may make a number of caps without marring the impression, and should make at least two. On the best cast cut a shoulder, using a coarse sandpaper disk or a bur on the engine, the copper band being in place.

Cut this shoulder so that the gingival margin of the cast will stand out, not in, as you find it. Obtain the gold capsule at the depot if you wish, but if making a jacket crown you must make the platinum capsule on your seamless crown outfit. From here proceed with your favorite method of outside seamless crown swaging if you wish. However, this crown, having no contour, may be perfectly and perhaps best made by using simply a hammer and a piece of soft pine. Drive the second cast above referred to into the pine a short distance at a time, following each time with the first cast covered with the metal capsule. When perfectly adjusted melt out the fusible alloy, boil in nitric acid, and trim to the indicated gingival margin.

To form a regulating attachment to a cuspid erupting in the roof of the mouth I have forced a copper band well over the top of the tooth and under the gum. With the copper band still in place fill the same with plaster and force the latter forward with pieces of cotton. When quite hard remove, dry, and run with fusible alloy, using the paper tube as before. A cap which will go one-eighth of an inch under the gum can quickly be made and set to place with any attachment desired soldered on, thus avoiding the hole boring usually resorted to in such cases.

Perfectly formed teeth without occluding antagonists are sometimes made into bridge abutments. A cap extending to the greatest circumference of the tooth is often desirable for many reasons. With the wire dentimeter decide on this margin and make a copper band as indicated, and proceed as before. Reinforce this cap externally with solder only, or better, by doubling the occluding surface. This doubling may be done internally if preferred. This will give the most perfect bridge abutments possible, firm, immovable, and no irritation to the gums.

One more idea under this class: Platinum caps in all porcelain bridgework for molars and bicuspids are most quickly and perfectly made, in which cases the band goes under the gums, the teeth being cut away very severely.

Many there are who will not use an open-faced crown; others have never made a jacket crown; many object to bridgework abutments which do not hide the margins under the gums, while a greater number have never seen the need for a modern porcelain bridge, but few there are who do not constantly find necessity for

the combination metal and porcelain crown as represented by the Richmond, so the next application of my scheme comes nearer interesting all dentists than those I have before mentioned. I propose a quick method for swaging a metallic base for a porcelain crown, the shape of the end of the root being regular or irregular, the demand being a banded cap, a semi-banded cap, or no band. Since opening my office more than ten years ago I have been using a furnace-made crown for all single crowns, that is, for all crown work except for bridge abutments. Since obtaining a furnace I have not put on a single Richmond, and very few Logans. The crown I will describe in order to apply my method for swaging the base I believe to be the ideal.

For bicuspids where possible I have always used a full band, while for the upper six anterior teeth I have grown to use less and less of a band on the labial side. Before cutting away the tooth entirely to the gingival line, bevel the edges of the root for the band. For the upper six anterior do not bevel the labial border, but with these teeth after beveling the other three sides grind off the face of the root about at right angles to the axis, leaving the root extending above the gum on the palatal side at least one-sixteenth of an inch or more if possible. Then grind the labial third of the face of the root one thirty-second of an inch or more under the gum margin.

At this stage it is well to fit the pin or pins into the enlarged canals. For bicuspids I use two pins, spaced from each other as far as possible. The external pin extending into the porcelain but a short distance I bend, roughen or head. With the six anterior, where the canal has been enlarged by decay or otherwise, select a pin large enough or else slip in on the labial side another piece of platinum thick enough to finish filling the opening. Remove the pin or pins and fill the hole with cotton or wax all but the last sixteenth of an inch or less. With the use of the dentimeter make and fit a copper band over the end of the root, and while still in place fill the open end with plaster mixed thin and force forward with cotton. When quite hard remove, dry, form the paper tube, and run with fusible metal. Cut the shoulder with the sandpaper disk or bur as before, with the copper band in place on the cast. Swage a cap over this cast, as you please. I have found the quickest method is to stand the cast upright by aid of modeling compound in the brass cup of the Brewster swager. Cut a piece of platinum large enough

to reach all expectations. Use a little wax to stick or hold the platinum in place on the end of the cast while it is placed in the swager. Use the solid rubber and strike hard. With coaxing and burnishing you will have a perfect fit in a few minutes. With a steel chaser drive in the depression for the pin hole. Some time may be saved by the use of the capsule made by the seamless crown outfit, especially for wide bands. If without this machine, use a pair of narrow-nosed pliers to prevent the buckling.

Having trimmed and finished the cap to fit the cast, place same in the mouth and with a pointed instrument punch the pin hole. Place the pins in place through the cap, fasten with sticky wax, remove, invest, and solder with platinum solder. Here we have the finished base, which again place in the mouth and take an impression and bite in modeling compound, allowing the same to become quite hard. On the articulator cast from this grind up your facing selected before dismissing your patient. See that the pins of the facing touch the extended end of the dowel or nearly so. Fasten the facing to the metal base with sticky wax, remove from the cast, invest, and after making sure that the pins are in contact, solder with platinum solder or with pure gold, using very little and fusing to a high heat so that the gold loses its color by alloying with the platinum. Clean the work thoroughly and we are ready for the porcelain.

THE BANDLESS PORCELAIN CROWN.

BY R. A. PRITCHETT, D.D.S., WHITEHALL, ILL. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

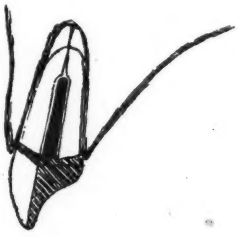
After an observation extending through several years the writer has concluded that for incisors, cuspids and bicuspids the so-called Richmond crown, the baked porcelain, or any other crown with a band, is not fully up to that high standard of excellence which is demanded when it becomes necessary to replace the natural crowns of these teeth.

In presenting this paper it is not my purpose to extol the merits of a new crown, but rather to direct attention to some of the advantages resulting from the use of bandless porcelain crowns in general, with the Logan as the type, and when I speak of the Logan crown

as the type I do not refer to it as it is ordinarily fitted to the root of the tooth to be crowned, but as prepared and set in the manner hereinafter described.

Before mentioning the advantages of the bandless crown over those made with a band encircling the root of the tooth, I will refer briefly to some of the disadvantages of the latter. First perhaps in importance is the irritation to the gum tissue resulting from the presence of the band underneath the free margin of the gum. (Figs. 1 and 2.) Although the band may be fitted with great care, so that there is no impingement on the peridental membrane, and even though it be made ever so thin, it acts as a foreign substance and is a constant source of irritation, however slight it may be. If the

Fig. 1.



band is fitted so as to be entirely under the gum it is the testimony of most patients that they are always conscious of its presence.

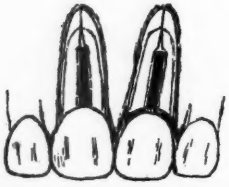
The result of this constant irritation in many cases is recession of the gum and slight absorption of the alveolar process, inasmuch as absorption is the inevitable result of mild irritation. It is not natural to have any foreign material occupying the space between the free margin of the gum and the tooth, and the gum tissue never grows tolerant. After the gum has receded from the band (Fig. 3) that portion of the root exposed becomes an unhygienic area, invites decay both rootward or gingivally and under the band and cope of the crown, thus undermining the crown and shortening its life.

As it should be our constant endeavor to conceal our art, some method should be followed whereby the joint between the crown and the root can be permanently concealed. As the gum will sooner or later recede from the band, the latter will then be exposed to view and the deception revealed.

At the base of the body of a baked porcelain crown with a band there is a space between the porcelain and the platinum cope, since porcelain and platinum do not unite. This space in many cases causes a dark blue line to appear at the joint between the porcelain and the metal. This latter unsightly and unhygienic condition is due to the penetration and decomposition of secretions and is, of course, decidedly objectionable. It is impracticable to prevent this darkening, in the region of the cope of the crown, from being transmitted to the porcelain at its base, thereby causing an unnatural appearance.

Among the important advantages of the Logan over any crown with a band are the following—A Logan crown, if properly fitted to the root to be crowned and polished so as to have a smooth surface throughout, is perfectly hygienic and non-irritating to the gum

Fig. 2.



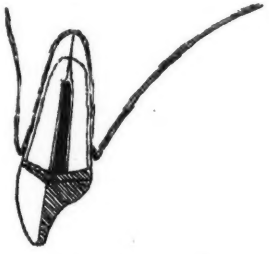
tissue, because it has practically the same contour and a similar surface to the original crown of the tooth. (Fig. 4.) The gum septum between the crown and the approximating teeth will remain intact and perform its normal function, and the liability to irritation of the peridental membrane in the interproximal space is reduced to a minimum, since the crown and root form one continuous smooth surface and are more compatible to gum tissue. In the Logan the union between the crown and pin is the strongest that can be obtained, because the crown is constructed of one homogeneous mass of porcelain, which has been molded and baked under pressure and of a higher-fusing body than can be used with the so-called baked porcelain crown. On this account the crown is stronger in all its parts than those crowns in which the porcelain body is applied to the lingual surface of the facing and then fused.

Since the most permanent means of attachment of a dowel crown

is by means of cement, another objection to a crown with a band is encountered during the process of mounting the finished crown upon the root. After the canal has been dried and filled with cement the crown is forced into its proper position, and the only means of exit of the surplus cement being between the band and the root, the cement is forced against the delicate tissues adjoining the peridental membrane, thereby causing the patient to suffer undue pain from the pressure and irritation of the cement. When a Logan crown is set the excess of cement flows straight out from the joint between the crown and the root and is deflected to the free margin of the gum without much inconvenience to the patient.

The Logan crown as usually fitted and mounted on the root is open to considerable objection (Fig. 5). The method followed by

Fig. 3.



most operators is to grind the root to the gingival margin on its labial surface, leaving it from 1 mm. to 2 mm. above the margin of the gum on the lingual surface, and then fit the crown to it. Inasmuch as a perfect joint between the crown and root is seldom obtained, and since the joint passes through areas habitually unclean, the usual results are decay of the root and failure of the work. When the crown is mounted in this manner its resistance to the strains from the lingual during mastication is borne solely by the labial portion of the root, increasing the tendency of the latter to fracture under heavy stress.

The method of fitting and mounting the Logan crown as practiced for several years by the writer is as follows: After treating and filling the root of the tooth to be crowned, that portion of the natural crown remaining is removed by cutting from the mesial to the distal or from the distal to the mesial—according as the cavity

is on the mesial or distal surface—with a small dentate fissure bur, which is rotated very rapidly by means of the electric engine, and the line of cutting is as near the gingival margin as practicable. The root is ground down even with the gum margin by the use of a thin carborundum wheel, and is then cut very short all around, being cut as far under the gum on the labial and lingual as possible without injuring the peridental membrane. The end of the root is made to follow the outline of the gum line in general, being highest next the gum septum in the interdental space and lowest on the labial and lingual sides. By cutting the root in this manner the strains from the lingual come upon the lingual portion of the root and upon the porcelain in its strongest part, thus reducing the liability of fracture of the root to a minimum.

Fig. 4.

This cutting of the root under the gum is best done with a large inverted-cone bur rotated at high speed. If the handpiece be held very firmly and a sharp bur be used the root can be cut down quickly and with but slight discomfort to the patient. With a little practice the root can be cut far under the gum without any laceration of the soft tissues. My reason for cutting the root so short and extending the porcelain so far under the gum is that by so doing the joint is entirely protected by the gum tissues, and that part of the crown at the free margin of the gum being smooth porcelain, there is no resultant accumulation of food debris and irritation of the gum. If, as just indicated, the conditions are conducive to healthy gum tissue about the crown, there will be no recession of the gum with probable decay of the root.

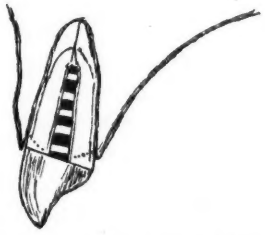
The gingival margin of the crown is now ground to fit the root, care being taken to have the crown correctly positioned. It is essential that the periphery of the crown be ground to coincide with the

periphery of the root, so that after completion of the case the joint between the crown and root will be a smooth one. The adaptation of the crown to the root may be greatly facilitated by using carbon paper between them while fitting.

In some cases the crown as received from the dealer will be too short to properly fit the root at its lingual margin, which defect makes it necessary to build up the crown with porcelain body and fuse in the furnace, afterwards grinding to fit the root. After thoroughly cleaning and drying the root canal and crown, the canal is filled with cement mixed as thick as can be introduced into it and the crown is placed in position on the root.

In fitting the crown to the root it is essential that the operator constantly strive to reproduce the natural crown of the root in every

Fig. 5.



particular, and if this ideal is kept before the mind the result will be a crown that for comfort, permanency, usefulness and natural appearance is the peer of any in use to-day.

Discussion. *Dr. Hart J. Goslee,* Chicago: A discussion of this excellent paper naturally resolves itself largely into a consideration of two phases of the construction and application of artificial crowns: First, the requirements of adaptation to the root, and second, the advantages of and objections to the employment of a band. I think it is generally conceded that the protection and preservation of the root, and consequently the permanency of the operation, demand the highest possible degree of accuracy in the adaptation of the crown, and furthermore, that it is also acknowledged that this desirable degree of accuracy can be obtained much better by burnishing or swaging a cap to closely conform to the basal end of the root than by grinding one surface to fit another. Hence, when a

favorable degree of permanency is desired or to be expected some means of obtaining as close a joint as possible between both the base and periphery of the root and crown should always be employed, and for this reason the procedure outlined in the paper is much preferable to the simple application of ready-made crowns by grinding, such as is the common practice. Indeed, it is my belief that ready-made porcelain crowns should never be adapted, as they were originally designed and intended, for any other than temporary purposes.

The employment of a narrow band encompassing the end of the root is advocated as a means of carrying the immediate joint between crown and root to a point less accessible to the penetration of secretions, and thus more immune to their deleterious action, as well as for the purpose of giving increased stability to the attachment of the crown and protection to the root. The question of the presence of such a band detracting from the artistic appearance of the crown, and almost invariably proving a source of irritation to a more or less injurious extent, is altogether a matter of proper root preparation and adaptation. Any such irritation is of a *mechanical* and not of a physiological nature, and such pathological effects, in my opinion, are not the result of the principle but of its faulty application. Hence I have always believed and maintained that the employment of a band insures greater stability and protection to the root, and furthermore, that if the periphery of the projecting end is properly prepared—a procedure which is usually performed in the most perfunctory manner, however—and if a *narrow* band of a thickness of metal sufficiently heavy to retain its shape under the stress of fitting is well and closely adapted to the sides of the root, and allowed to pass but a short and uniform distance beneath or within the free margin, so as to closely follow the cervical curvature of the tissue and thus afford no impingement upon the membrane, that the mere presence of a band will afford no mechanical irritation, and that the objections will be thus largely if not entirely overcome.

As to the employment of the Logan crown in this manner, the procedure advocated is an improvement upon the usual simple method of mounting, and yet I cannot see any advantage in confining one's efforts to the use of any style of crown which does not afford the greatest possible variation of moulds for selection, and

none of the ready-made porcelain crowns is made in as large a variety of moulds as are the ordinary facings. Furthermore, it is often difficult to obtain a crown the base of which approximates the dimensions of the end of the root sufficiently well to result in a close peripheral joint. These features, together with my objections to the form and softness of the dowel of a Logan crown, warrant me in saying that uniformly better results are to be obtained by using an ordinary facing and making a properly constructed porcelain crown.

Dr. F. E. Roach, Chicago: In my opinion all that the essayist has said is literally true. What he states regarding care and proper adjustment of the band to obtain satisfactory results applies with equal force to the crown without a band, except that such results are more often obtained with the latter in the hands of the operator who takes equal pains in root preparation and in securing adaptation and peripheral continuity of crown to root. The band advocate charges our failures to faulty application, but this likewise accounts for the failures with the bandless crown. Granting that the majority of cases might be done just a little better, the fact remains that but few cases have come under my observation that were free from both peridental irritation and the visible band. Granting also that the band may be used to advantage in inconspicuous localities in the mouth, I am nevertheless in favor of its elimination whenever possible, and for the six upper anterior teeth it is rarely necessary for individual crowns. Gum irritation from the bandless crown is caused by lack of peripheral continuity of crown with root. Fracture of the root may be attributed to improper root preparation, poor adaptation, or a short pin. My requirements for a bandless crown are briefly as follows: Small, rigid, flat or square post equal in length or if possible longer than the crown, root trimmed within free margin of gum and with convex end, perfect continuity and adaptation of crown. Greater provision should be made for easy removal of pin in case of breakage, so the crown should be set with gutta-percha or chloro-percha and cement.

Dr. Robt. Goebel, Lincoln: We have all observed the irritation and recession of gums around banded roots, even when the work was done by the most skillful. The crown made with platinum cope is even more objectionable than with gold if the gum should recede. A partial band encircling only the approximal and lingual surfaces

of the root is far preferable to the full band. It adds greatly to the stability of the work and more perfectly seals the end of the root. The plain porcelain crown is a true and tried operation, and when skillfully made is all that can be desired from an esthetic standpoint. It is generally applicable to the six anterior teeth, and will undoubtedly continue to fill a prominent place in operative dentistry.

Dr. Pritchett, closing discussion: It is quite natural that a paper advocating a method of procedure somewhat at variance with the views and practices of a large part of the profession should meet with opposition, so I was not surprised at the opinions of Dr. Goslee. Porcelain crowns without a band, when properly fitted to the root, in most cases give permanent service, as you have all observed in clinical experience. It is no unusual thing to see some of these crowns fitted as long as thirty years ago still giving good service in the mouths of patients, and with the gum tissues about them in practically normal condition. It is not necessary, as advocated by Dr. Goslee, to place a narrow band underneath the free margin of the gum as a means of carrying the immediate joint between the crown and root to a point less accessible to the penetration of secretions, inasmuch as in the method described in the paper this joint is made in close approximation to the peridental membrane and has as much protection from oral secretions as does the gingival margin of a band occupying the same relative position. It is my belief that it is impossible for even the most expert operators to so fit a band underneath the gum margin that it will make a smooth joint with the root and reproduce the natural outline of the original tooth and root. In nearly every such case there will be more or less irritation made manifest sooner or later. We all know that porcelain is more compatible to sensitive tissue than is gold or platinum, hence porcelain alone should be used to reproduce the crown of the tooth.

Dr. Roach is correct when he says that most failures of bandless crowns are attributable to a lack of employment of the same care and skill as are used in the fitting of a banded crown. I wish to emphasize this point especially—that as much time, care and skill are necessary in properly selecting and fitting a bandless crown as any banded crown, and if this is done more pleasing and lasting benefits will generally accrue from the use of the former.

My judgment is that a bandless crown should always be set as

rigidly as possible and with an inelastic substance. As far as my experience goes some form of cement is the only material that will answer these requirements.

MASTICATORY CHANGES INDUCED BY FOOD ENVIRONMENT.

BY T. ELHANAN POWELL, D.D.S., CHICAGO. READ BEFORE THE ILLINOIS STATE DENTAL SOCIETY, AT PEORIA, MAY 10-12, 1904.

In Genesis we find, "In the beginning God created—." It is not our purpose to take issue with this positive statement, but we do wish to make humble inquiry as to the manner of creation. No logical person will deny that God created, but the investigating mind must of necessity inquire in what manner did the great Creator perform His task. Does the beginning mean the first few hours of the world's existence, or is it simply an expression signifying a cycle of time? Did He first make the clay with His own hands, and then model it into the form of man, immediately afterwards breathing into his nostrils the breath of life, or did He, by the slower process of chemical affinity and atmospheric changes, reel off from the spindle of years, atom by atom, this grand old habitation of man, which we call the earth? We believe that He did, and that subsequently was formed from some primitive substance, cell by cell, that which we are pleased to designate as animal life.

After cycles had come and gone He called forth from this animal life in its lower forms, through the operation of the laws of adaptation to environment and natural selection, the masterpiece of creation—man, the image of God, designed to be the terrestrial embodiment of intellectual and spiritual perfection. With reverence toward the Creator; with love toward His creatures; without violating, we believe, any of the essentials of Christian tenets; we believe it impossible for scientific minds to accept any suggested solution of the manner of creation not in consonance with the theory of evolution. Evolution is a working hypothesis, and is not, necessarily, the last word on the subject, but its premises are so reasonable and the conclusions so definite that it is imperative we accept it as offered until a better theory is advanced. This paper is to deal with masticatory changes induced by food environment, and its philosophy is based

upon the acceptance of evolutionary doctrines. The diversity of functions in homologous organs leads us to speculate upon the causes of the same.

The beginning of life would be an interesting chapter, could it be revealed to us with accurate explicitness, but we have not definite knowledge, so accepting the above hypothesis as a working basis, we must believe that the first living creature was a mere cell. Let us now endeavor to trace the gradual rise of animal life from this low form to the highest type. The original cell had no functional activity because its needs demanded no such thing. External conditions might bring into close proximity substances which could be appropriated as food, and through the attraction which one moist substance has for another one portion of the cell might be elongated sufficiently to encompass the food product, which would eventually be assimilated. This process of elongation would bring about the development of fibrous tissue. In logical sequence arms and fingers would follow. The digestive apparatus, at first only a form of chemical absorption, would finally be specialized as a distinct stomach, with oral and anal openings. Thus would be added one organ after another, until we arrived at the first sub-kingdom. Next would come reproduction, which is followed by respiration and circulation, and a nervous system bringing with it a multitude of functions giving increased power for activity and enjoyment.

"Away back yonder"—some millions of years before the dawn of our present civilization, a ray of light coming in contact with the sensitive nerves of a creature well advanced in functional development, and focusing its rays at one point, finally brought into existence that wonderful organ of sight, the eye. Then, like the influence of civilization upon the savage races, when one step forward was taken, another soon followed, until there resulted an animal possessed of the five special senses—sight, touch, taste, smell and hearing. As the form of life became more complicated the demand for diversified fuel to feed the machinery became manifest. The more highly developed the animal the more active it became, and this activity increased the demand on the digestive apparatus.

To adapt the food at hand to the growing needs Nature began the specialization of tooth forms. The lower invertebrates have no real masticatory organs, but depend entirely upon the juices of the alimentary canal for the assimilation of food, the oral cavity

being provided with cilia and slightly-furred mucous membrane, for prehensile purposes.

The stomacholiths have molarlike protuberances in the stomach which aid in preparing the food for assimilation—e g., the crab, which has the dental appliances confined to the hands and feet for prehensile purposes and for battle.

The cuttle-fish has an interesting dentition, as has also the sea urchin, the latter having five incisor-like teeth arranged in rotary form, with one side only covered with enamel, making chisellike weapons which are very effective.

Leaving the order of invertebrates, we will speak of the fishes, the first order of vertebrates. Here we find great diversity in the masticating apparatus, the teeth having but one function, namely, prehension. Attachment is usually made by fibrous membranes, but occasionally by the other methods, and the teeth are found in every conceivable position—on the jaws, tongue and throat, as well as on the head and back. They are in shape conical and recurved, their number being from one, as in the myxine, to hundreds and often thousands, as in the pike and cod.

One of the most formidable types is the shark, the tiger of the sea, voracious and ferocious, with teeth arranged in rows around the margin of the maxilla and the mandible. Several reserve rows lie flat against the mucous membranes, rising up when occasion requires them to take the place of other teeth which have been lost. The gastric juice acts powerfully upon animal tissue, digesting in a few hours an animal weighing 150 pounds.

Respiration in fishes is carried on by means of the gills, the blood taking up its oxygen from the air in the water. There is one exception to this general rule, the dipnoi or lung-fishes. This species is the connecting link between fishes and reptiles. The dipnoi have teeth in the mandible very much resembling tubercular molars, and they also have dentary plates in the roof of the mouth for crushing their prey.

One peculiarity of fishes which materially facilitates their movements in the water is the possession of an air sac beneath the spine, connected with the stomach by a pneumatic tube, which enables them to fill or empty the sac at pleasure, as they rise or descend in the water.

Next in order come the reptilia, differing not so much in their

dentition as in some other features, the vertebral column being stronger and more osseous, and the nervous system of a more advanced type. Respiration is now carried on by means of lungs instead of gills. In fishes the fins, modified forms of hands and feet, are used in swimming, but in reptilia the organs are required in moving about over the land, so we find the modification in the limbs and not in the teeth, the food required being still of a simple nature. Some of the lower species of this order have no teeth at all, as in the toads, but some of the higher species have a large number. Attachment is made usually by gomphosis or ankylosis. The salamander here comes in for special mention, on account of his being, in the opinion of some, the horrible ancestor of man. We find him possessed of five fingers and five toes, but unlike his mighty descendant, he has from sixty to eighty teeth. These are ankylosed to the outer groove of the jaws, similar to the attachment of the ribs, and are therefore called pleurodont.

We must mention in passing the dentition of the snake, whose teeth are merely for prehension; of the crocodile, with his eighty teeth, sharp, conical and ankylosed to the jaw, and of the turtle, with his birdlike beak and a lack of masticating apparatus. There are many others, but time forbids further enumeration.

The birds have no dentition, feeding on grain, insects and animal food requiring none. The variation in the form of the bill is interesting, as indicating the character of the food. The grain-feeders have short, blunt bills; the insect-feeders have long, slender ones, and the carnivora have sharp, hooked beaks, enabling them to peck and tear to pieces the flesh. There are some extinct varieties of birds having some features allied to the fishes, and in these are found true teeth, sharp, conical and recurved, with a form of attachment similar to that in the fishes.

One other feature possessed by our feathered friends, and not found in other animals except the fishes, is the air sacs, situated underneath the wings. These can be inflated at pleasure, enabling them to soar high above the clouds or to hover near the earth.

Coming now upon the next higher order, we approach the mammalia. From the cold-blooded and oviparous fishes to the warm-blooded and viviparous mammalia is a far cry—in respect not only to the circulatory and reproductive organs, for the difference in the nervous and digestive apparatus is much greater. In fishes and

reptilia the neural substance is confined to that portion of the spine antecedent to the cerebellum, but in the mammals we find a second stage of neural development, and a long stride towards the third. The seat of action is well developed and traces of the reasoning faculties begin to appear.

The choice of food is not so circumscribed and the ability to obtain it is much increased. Except in the lower species, as exemplified by the sloth, armadillo and edentata, the masticatory changes are pronounced and their efficiency manifestly enlarged. In the order of mammalia we find the widest diversity of tooth forms, adapting a food-reducing mechanism to a wondrous variety of food substances.

The kangaroo is one of the most primitive types of mammalia, having a low order of nervous development and other functions of a correspondingly low type. The upper incisors are well developed, but the lower incisors are attached to the mandible in a horizontal position, coming together as a pair of scissors and enabling the animal to crop the grass on which it feeds. The young are brought forth in an immature condition, and are carried in the marsupial pouch until sufficiently developed for a separation.

We mention the shrew, with its forcepslike incisors; the English hedgehog, with its insectivorous dentition; the chiroptera, which includes the vampire bat, and pass to the beaver, the next link in the ever-lengthening chain. The dentition of this animal is highly specialized, the incisors being scalpelliform, with a chisellike edge. With these he cuts the timbers used in the construction of his home. Among the other rodents may be found the rat, the squirrel and the hare, all having a dentition similar to that of the beaver, which forces the animal to continually gnaw in order to preserve his life.

The carnivora, being the representative meat-eating class, must next have our attention. The teeth are highly specialized, having the hingelike attachment of the mandible, and having only a vertical movement of the jaws. The digestive tract is short and simple, hence little preparation of the food for alimentation is required. The carnivora are at one extreme of masticating specialization and the herbivora are at the other.

It is a great mistake of civilized peoples to prolong the act of mastication of meat. Meat really requires no mastication at all, but if taken in an almost raw state, as it should be, the simple chopping treatment, as given it by the carnivora, should be all-sufficient.

The majority of all classes of mammals have the set of milk teeth, which are shed after the period of lactation is passed. There is one exception to this rule—the phocidæ or seals, which shed their milk teeth in fetal life. Here is evidence of a transitory condition, the emergence of an animal from the aquatic stage to that of a full-blown land animal.

Among the ungulata we mention the ox, sheep, deer, etc., these being the high types of herbivora. These animals are the cud-chewers, and have more than one stomach, in one of which the food when gathered up is reserved for later attention. During repose the animal thoroughly prepares the food for the assimilative tract. The loose-hinge mandible of this type permits a wide range of masticating movements, both horizontal and vertical.

To represent the antero-postero movement of the jaw, we suggest the elephant, the extinct mastodon and dinotherium. As to number, the mammalian type of dentition is illustrated by the horse and the pig, each possessing forty-four teeth.

We might give you next an extended list of monkeys, apes and baboons, describing in detail the dentition of each, but will spare you the tiresome details. Suffice it to say that from the American monkey, with his thirty-six teeth similar to those of man, to the chimpanzee and baboon, there is a continual improvement in the fineness of tooth structure and facial outline. The Australian savages have the coarse structural outlines; the increase in the molar series from front to back; the high cusps on the premolar series; wide laterals and extended cuspids. These savages more nearly approach the monkeys in their dentition than they do civilized man. Another feature which marks the dentition of the Australian savage is the possession of sixteen molars, instead of twelve, as in civilized man. We find this same characteristic in some of the African tribes. These tribes all have large teeth, with a corresponding development of the facial bones; this, with a retreating forehead, gives them an extreme prognathism which much resembles that of the apes. The cause which has contributed to this heavy dentition is the nature of the food supply, coupled with the lack of manipulative appliances, so the teeth are used as tools, and this has tended to enlarge and strengthen them, as well as to contribute to the massiveness of the facial bones.

The American Indians have large teeth, as well as enlarged

maxillas. They sometimes possess six incisors in each jaw, instead of four as in civilized man, but no example has been found of the existence of sixteen molars. The Esquimaux have small teeth, which are, however, in proportion to their small osseous development, occasioned by the nature of their food. The xanthochroi or light races, are nearly all macrodont or large-toothed, the civilized races of Europe and America being hybrids between the xanthochroic and melanochroic races. They are consequently subject to crowding and irregularities, with all the attendant train of tooth misfortunes. Add to this cause of irregular dentition the enervating influence of civilization, with its complicated social evils, there is small wonder that suffering from one end of the alimentary canal to the other is the heritage of them that live in the twentieth century.

DISCUSSION. *Dr. R. Beck,* Chicago: I do not see how the essayist can accept the positive statement according to the Bible that God created man in His image, and immediately after support the Darwinian theory of the origin of species. That the latter is more than a working hypothesis has been demonstrated recently by the German scientist, Haeckel. He reports that discoveries were made of skeletons of a high type of monkeys, almost identical with the homo. They were pronounced then what was termed the missing link, or the step between monkey and man. He makes the claim that, by the established law of survival of the fittest, while the unfit perished the other maintained himself and gradually developed into the present status.

I must take exception to the doctor's new theory that it is a mistake for civilized people to prolong the act of mastication of meats, and that the latter should be in a raw state for eating purposes. It is not sufficient, as in the carnivorous animals, for their alimentary tract is not so extensive as the human, nor are the digestive juices of the same chemical composition. Physiology and clinical observation teach that in order to maintain good health the food should be properly cooked and reduced to a minute state before it is allowed to enter the stomach.

The mixing of races can hardly be taken as a logical cause of the irregularities and malformations of teeth and jaws among Americans and Europeans. It has been my privilege to examine a great many mouths in free dispensaries, and I find that the loss of tooth structure is mainly due to neglect and improper diet. I base

my opinion upon examinations I made of a great many skulls in Rome and Pompeii of people dead over two thousand years. I found that in nearly all cases the teeth were well preserved, retaining the typical cusps, etc., and we are told that they lived upon a vegetable and fish diet. It is my opinion that people who eat a great deal of meat, like the Americans, are more subject to wear of teeth than the Europeans, especially the poorer and working classes, who enjoy the privilege of eating meat only once or twice a week.

Dr. A. D. Black, Chicago: We ought to have more papers along these lines. This essay did not bring out as fully as I expected that which was indicated by the title. If it had done so it would have been even more interesting.

There are two large and widely separated schools in comparative dental anatomy. One insists that the changes in tooth forms are due to environment; the other and larger claims that environment has nothing to do with it; that those animals of each type that can accommodate themselves to changes in environment survive, while the others of that type perish and become extinct. A good example in point is the primitive type of the horse, the three-toed horse, which lived along the seashore on soft food. Its teeth and jaws were poorly formed and unable to stand much stress. After a while this horse migrated to the upland, where it had to live on grain, and what was the consequence of this change? The first school would say that the teeth became more solid and the jaws stronger to enable the animal to subsist on that kind of food; the second school would say that among these horses were some individuals who were better adapted to this change of food, and they therefore survived, while the others perished.

I had the pleasure of going over this paper with Dr. Williston of the University of Chicago, than whom there is no better comparative anatomist in the country, and he made several criticisms of it. The essayist says that the teeth of fishes have but one function—that of prehension. That is not strictly correct, because many fishes have teeth for crushing and prehension, and others solely for crushing. The eagle ray has both the floor and the roof of its mouth covered with teeth, making a solid mosaic pavement. The teeth are not sharp and are used only for crushing. The essayist also says that the teeth of fishes usually are attached by fibrous membrane. Two or three hundred species have their teeth held in that

way, but the majority, about ten thousand, have them attached by ankylosis to the jaw bone. In reptiles the teeth are attached by gomphosis, each tooth fitting in a socket in the jaw bone. He mentioned some fishes that have teeth in the throat. In no animal can there be a tooth below the larynx, because the teeth are derived from the epiderm, and the esophagus is derived from the endoderm. Some snakes use the prolongations of the vertebræ as teeth, by crushing with them substances in the alimentary canal.

The essayist classifies the toad among the reptiles. That is the old classification and is not used by modern writers, except Dr. A. H. Thompson. The toad is not a true reptile, because reptiles breathe entirely by lungs, whereas the toad breathes through gills in the larval state and lungs later on.

The transitory condition of the seal from sea to land is mentioned. Just the reverse is true; the seal is derived from the land carnivora and sheds its teeth early in life.

I wish to emphasize the fact that vegetables require more chewing than meats, as most of us have not noticed this point sufficiently. Many vegetables, such as corn and tomatoes, may pass through the alimentary tract without losing their identity, but meats never do that.

Dr. C. R. Taylor, Streator: We do not know how and why each animal selects its food, but after once doing so its environment will determine its form and shape. Take the whale—during fetal life it has teeth, but after birth it has none. The theory is that at one time the whale was a land animal and needed teeth, but when it took to water it changed its food, resulting in the loss of its teeth and the substitution of whalebone. We can change the color of a canary bird by changing its food, and can alter the form of an animal as well as its color by a change of food. Schmankewitsch took a shell animal from the salt vats of Southern Russia and put it into fresh water. The transfer changed the form of the animal so much that after several generations it became a new species. Such a paper as this may seem theoretical, but as a matter of fact it is very practical, for a comprehensive study of the question will help us in many ways. The use and abuse of certain foods are working havoc with the teeth; they are not used as they should be, and the result is all these malformations and diseases. There is not only

a tendency to degeneration of tooth structure, but also to loss of material.

Dr. B. J. Cigrand, Chicago: I believe it was Owen who said that the world was divided into three classes, vegetable, animal and mineral. In his latest work he said that it ought to be divided into two classes, animal and mineral, because animal and vegetable are so much alike that no man can distinguish between them. We have a proof of that in Lumeian's statement that animal life enjoys three stages of existence—it moves, feeds and feels. He also said that vegetable life fed and lived, and that the mineral grew. Recent investigations show that this was an error, because not all living things move; the oyster, sponge and coral are exceptions, nor do vegetables always remain stationary, as we have roaming ocean plants.

Again, that change of form causes a change of food is illustrated in the tadpole, which in early life lives on vegetables, but when it becomes a frog it lives on animal food. Another illustration is the caterpillar, which lives entirely on vegetable food. When it becomes the butterfly its diet changes. The moth lives and feeds during its early existence, but when fully matured it never eats again. Those are peculiarities of nature that we shall probably never fathom. The mistletoe is a parasite. Plant it in the earth and it will not grow, but plant it on the bark of an oak tree and it grows immediately. The spider builds his web in the sunlight, in the dry air, knowing that the flies will gather there. The bee flies far from home on a bright, sunny day, knowing that it will not rain and it can carry its honey home. The sea gull flies over the ocean when it is low, knowing that then the fish swim high. In rainy weather he seeks the swamps to take up other forms of life. To know physiology and anatomy it is necessary to study the earlier forms of life and the habits of animals and plants.

Dr. Powell, closing discussion: In the consideration of this subject we must bear in mind that life is changing constantly. Even man is changing physically, mentally and spiritually. The influence of civilization on the savage races is an indication of the survival of the fittest. These things are of interest to us and should cause us to pause and think, and the influence the teeth have on civilization is of great importance, and the more we know of this influence the better dentists we will be.

Digests.

CHEMISTRY OF PULP DECOMPOSITION, WITH A RATIONAL TREATMENT FOR THIS CONDITION AND ITS SEQUELAE. By J. P. Buckley, Ph.G., D.D.S., Chicago. Abstract of paper read before the Fourth International Dental Congress, at St. Louis, 1904. By way of introduction the author maintains that the application of drugs for the correction of putrescent conditions can never be placed on a rational basis until we more fully comprehend the chemical reactions and thus obtain a definite notion of the end-products produced by decomposition of pulp tissue. In his study of the substances found in animal tissue he erects two classes based on the presence or absence of nitrogen. He then at considerable length describes the nitrogenous and the non-nitrogenous substances. He continues as follows:

Fermentation and Putrefaction.—Before doing so, however, it may be well that we have a clear understanding of what is meant by the terms fermentation and putrefaction. These are applied to peculiar kinds of decomposition by which the molecules of certain organic substances are broken up into simpler compounds. The difference between the terms is that fermentation is applied to the decomposition of those substances which belong to the group of carbohydrates, while putrefaction is applied to the decomposition of those substances which properly belong to the proteid group, and are classified as nitrogenous substances.

Pulp Decomposition.—The decomposition of the pulp tissue is essentially an analytical process, which takes place gradually. Through the agency of microorganisms these complex bodies are broken up into simpler and well known compounds. That is to say, the microorganisms first act upon these complex and unstable substances, splitting them up into less complex compounds, which, however, are capable of further analysis, and the process goes on, conditions being favorable, until the decomposition is complete.

The desire to acquaint myself with the nature of the reactions taking place in this process has led me to do much investigating along this line during the last few years, and I state here, without any hesitancy, that the chemical reactions taking place in the pulp

chamber and root canals of teeth containing pulps undergoing the process of decomposition cannot be duplicated in test tubes in the laboratory. This study and thought, however, have caused me to come to the following conclusions, which I trust will agree with the clinical experience of every careful observer.

I believe that the initial process in the decomposition of the pulp tissue is one of *fermentation,* which is brought about by the action of microorganisms upon the carbohydrate constituents, producing among other compounds such acids as carbonic, H_2CO_3 (H_2O+CO_2), and acetic, $HO_2H_3O_2$, depending largely upon the microorganisms present in the tissue. This creates an acid medium which favors the action of those microorganisms, here ever present, having the power to decompose the complex proteid molecule in such a medium, and the process of putrefaction is thereby inaugurated. Among the first agents produced are hydrogen sulphid, H_2S; putrescin, $C_4H_{12}N_2$, and two isomeric substances, cadaverin and neuridin, $C_5H_{14}N_2$. As the process goes on these latter substances are gradually broken up, and ammonia, NH_3, or derivatives of ammonia, are evolved.

I have been led to believe, also, that the fatty constituents remain practically unchanged in the entire fermentative and putrefactive processes and that they exist in the putrescent mass of a pulp chamber and the root canals. The bacteria may split up neutral fats into glycerin and fatty acids, but other than this no change seems to occur. Every chemist is familiar with the fact that carbohydrates are unstable compounds; that they readily undergo the process of fermentation, and that neither an acid nor an alkaline medium is essential for the action of the exciting agent, whether it be a ferment or a microorganism. It is also well known that proteid substances are easily putrified by microorganisms in the presence of the *proper temperature, moisture and an acid medium,* all of which are present in a pulp chamber after the process of fermentation has begun. That fats are emulsified or saponified by alkalies, or ferments in an alkaline medium, is also a well established fact. Such a medium, I believe, in the pulp chamber of a tooth never exists from the time the fermentative process begins until putrefactive process is complete.

The End-Products. It is well to remember, then, that early in the process of pulp decomposition the carbohydrate and proteid or albuminous constituents are decomposed, and that the chief final

products are water, carbon dioxid, ammonia, acetic acid, and a semi-putrid substance which, for reasons mentioned, I believe is largely composed of fats, depending upon the extent to which the process of decomposition has progressed. It should be remembered, too, that simultaneously with the breaking up of the pulp tissue the dentinal fibrilae are also decomposed, and that the dentinal tubuli, as well as the pulp chamber and root canals, are filled with the end-products of the decomposition, together with little globules of fat or fatty acids.

Coagulating and Non-Coagulating Agents.—Having stated what seem to me to be the chief final products of pulp decomposition, and therefore the compounds with which we have to contend in the treatment of these cases, I beg permission to direct your attention to this phase of the subject. Those of you who have read the literature of our profession for the past ten or fifteen years know that the opinions of many investigators in regard to the penetrating or non-penetrating power of coagulating agents in a putrescent root canal are many and varied. The reason for this variance of opinion I have never been able to understand. Many of the leading men of our profession have objected to the use of coagulants in the treatment of putrescent pulps and abscesses without a fistulous opening, for the reason that such agents will, in their opinion, coagulate the albumin present, and thereby prevent their penetrating the contents, and that the coagulum is also liable to close the small root canals. On the other hand, there are many who advocate that albumin, though present, does not prevent the penetration of coagulating agents, and that such take place throughout the pulp chamber and root canals, as well as the dentinal tubuli. Both sides attempt to sustain their theory by many laboratory experiments. Those who object to coagulants in the treatment of these cases illustrate the coagulating action of such agents upon the albumin of a fresh egg. The conditions here are not at all similar. Should an egg which has undergone the process of decomposition be substituted for a fresh egg, it will be noticed that no coagulum is formed, for the simple reason that the proteid constituents (coagulable material) have lost their identity by chemical decomposition, and new compounds, with entirely different properties, have been formed. This explains, too, how the advocates of the penetrating power of these agents have seemingly succeeded in sustaining their theory. It has been shown

that coagulating agents, in contact with egg albumin in sealed capillary tubes, penetrate the entire mass, and that the action of these agents is self-limiting only up to the quantities used. By sealing these agents in extracted teeth, with the cementum removed, and embedded in plaster, it has been shown, also, that they penetrate the entire tubular structure. These experiments prove conclusively that coagulants will penetrate the putrescent mass of a root canal, but do not prove, to my mind, that albumin as such is here present. I am not anxious to antagonize either side in this controversy, but it is a subject, as I have previously mentioned, in which every practising dentist must be interested, and yet one which seems never to have been successfully settled. It therefore seems to me that we should not be overanxious to criticise each other's views, but each should study the chemistry of pulp decomposition, and thereby acquire a knowledge of the chemical facts relating thereto. It is by this method only that this subject can be scientifically mastered.

A Rational Treatment.—In selecting drugs, then, to be used in the rational treatment of these conditions, I shall eliminate the question of coagulation and select agents with reference only to their ability to unite chemically with the end-products resulting from pulp decomposition. In this connection we should remember that the putrescent condition has been brought about through the agency of microorganisms by a gradual analytical process; that many of these germs are pathogenic in character, and that among the first products of importance are hydrogen sulphid, putrescin, cadaverin and neuridin. The last-named compound, being non-infectious, is of little importance, other than to know that it is a nitrogenous substance from which ammonia is evolved by further putrefaction. Still, according to Vaughn and Novy, while pure neuridin is non-poisonous, it possesses a toxic action as long as it is contaminated with other poisonous products of putrefaction. This holds true for all non-poisonous bases. Hydrogen sulphid is important because it is an *acid gas* with a disagreeable odor, having local irritant properties, and also because of the part it plays in the discoloration of the tooth structure. However, I must say here, while I realize that hydrogen sulphid is an active chemical agent, in my opinion it has been greatly overestimated in the role it assumes in the discoloration of teeth from the decomposition of the pulp tissue. Putrescin and cadaverin are perhaps the most important compounds, in so

far as the correction of the putrescent condition is concerned, known to be formed in the splitting up of the proteid molecule. Like neuridin, they are basic nitrogenous compounds, capable of undergoing further putrefaction, evolving ammonia, but unlike this compound, while they were at first regarded as physiologically inactive, both these bases have been proven, by Scheurlen, Grawitz and others, to be capable of producing inflammation and necrosis.

Among the gases produced, then, in pulp decomposition are carbon dioxid, ammonia and hydrogen sulphid. As these gases are evolved in those cases where there is no free exit from the pulp chamber through a cavity, pressure is produced and in many instances they escape through the apices of the roots, carrying the poisonous ptomaines into the surrounding tissue; inflammation is thereby produced and alveolar abscess established. In those cases where we open into the pulp chamber and find a pulp undergoing the process of decomposition, and when the ptomaines and end-products have not been forced through into the apical tissue, our treatment should be to at once *hermetically* seal in the pulp chamber an agent which is volatile and thereby penetrating, and which as it comes in contact with the end-products will unite chemically, converting them into odorless and non-infectious compounds. Such an agent we have in *formaldehyd,* a gas, CH_2O, which occurs in commerce at a 40 per cent aqueous solution known as *formalin.*

It has long since been known that ammonia is one of the chief end-products in the splitting up of the proteid molecule. It is also known that formaldehyd unites with ammonia to form a solid compound, which is odorless, colorless and has a sweetish taste, known commercially as urotropin, chemically as hexamethylene-tetramin, with a chemical formula $(CH_2)_6N_4$. It is stated also on good authority that formaldehyd unites chemically with hydrogen sulphid and basic ptomaines, forming inodorous compounds. Formalin, however, is too strong a solution for our general use; therefore, believing that the fats remain practically unchanged in the process of decomposition, I have been using cresols, in combination with formalin, which act chemically upon the fatty constituents. Cresols are homologues of carbolic acid. There are three—meta-cresol, ortho-cresol, and para-cresol. The product best suited for our use is tri-cresol, a refined mixture of the three. It is a nearly colorless liquid, of a creosote-like odor, and is soluble in water to the extent of

a 5 per cent solution. Tri-cresol has been selected as the vehicle with which to dilute formalin for three reasons: 1. It is miscible with formalin in all proportions, thus making a good pharmacal product. 2. It is a good germicide—nearly three times as powerful as carbolic acid. 3. It acts chemically upon the fatty constituents, thereby properly disposing of these substances. The formula which I have been using with gratifying results in the treatment of putrescent pulps is:

℞

Tri-cresol,
Formalini, aa fl. dr. j (4.0 cc.).

M. Sig. On a small pledget of cotton, hermetically seal in the pulp chamber from twenty-four to forty-eight hours. One treatment is generally sufficient.

Treatment of Abscess without Fistules.—In the treatment of abscesses without a fistulous opening it is well to modify this formula. In these cases the decomposition of the pulp tissue is complete. The intermediate products (ptomaines) have largely been broken up, pus has been formed from the tissue surrounding the end of the roots, and the first step in treating such an abscess is to mechanically evacuate the pus. We have no necessity for using formaldehyd, then, in the same strength solution as in those cases where the pulp chamber, root canals and tubuli are filled with the putrescent material. The point I desire to impress is that formaldehyd in this strength solution *must* be confined to the tooth structure, for it is one of the most irritating agents known to the therapeutist. A safe formula for abscesses without a fistula is:

℞

Tri-cresol, fl. dr. j (4.0 cc.).
Formalini, fl. dr. ss (2.0 cc.).

M. Sig. Mechanically evacuate the pus and on cotton hermetically seal in the canals from twenty-four to forty-eight hours. Two or three, oftentimes one, treatments are sufficient.

Experiment 1.—Add to 5 cc. of strong ammonia water 3 cc. of formalin. A violent reaction takes place, forming urotropin $(CH_2)_6N_4$, which dissolves in the water $4\ NH_4OH + 6\ CH_2O = (CH_2)_6N_4 + 10\ H_2O$. The clear solution is evaporated, using moderate heat during the last stages of the process, when the urotropin is obtained as a white, crystalline solid.

Experiment 2.—Pass a stream of hydrogen sulphid into 5 cc. of formalin for a few seconds. The odor is at once destroyed. This proves that a reaction takes place. I hold that methyl alcohol, CH_3OH, is formed, and sulphur is liberated, $2\ CH_2O+2\ H_2S=2\ CH_3OH+S_2$. On evaporating the solution to dryness the methyl alcohol burns, leaving the sulphur, S, as a residue.

Tri-cresol, besides its germicidal power, dissolves the fatty globules which, if treated with alcohol (as is usually done in drying the canal), produces *lysol,* a good antiseptic. It is plain to be seen, then, that the *poisonous gases* and *liquids* resulting from pulp decomposition are converted by the proper use of formaldehyd and tri-cresol into *non-poisonous liquids* and *solids,* which are themselves antiseptic and germicidal in character. How can we imagine a more thorough sterilization of the dentin than to chemically produce within this tubular structure substances which possess these properties? Thus I feel justified in speaking of the use of this remedy as a *rational treatment* for the conditions under consideration. Marvelous results are obtained, and at the same time we know why.

It should be remembered that the formulas given are for general use. The practical dentist will soon find that it may be best to vary the proportion of the ingredients of the mixture according to the case at hand. One great advantage in using remedies containing formaldehyd is that the medicament *must be hermetically sealed* in the tooth in order to obtain the best results. This prevents the saliva from contaminating the medicine within the tooth and the medicine from contaminating the saliva in the patient's mouth.

The use of neither formaldehyd nor tri-cresol alone is original with the writer. I have studied the action of drugs, trying to place the treatment of these conditions upon a rational basis, and am gratified to know that such has been accomplished by the combination of formalin and tri-cresol in the manner which I have suggested. In conclusion, I desire to say that many of the statements made in this paper are based upon well-established chemical facts. I cannot, therefore, lay much claim to originality. However, I have endeavored to make a correct application of the chemical principles involved. The theory in regard to the decomposition of the pulp tissue may, perhaps, seem not to have been scientifically demonstrated; but it is the result of my laboratory investigation, and also

is in harmony with my close clinical observation. As such I present it to you for your consideration.—*Items.*

CALCO-GLOBULIN: A CONTRIBUTION TO THE STUDY OF THE PHYSIOLOGICAL AND PATHOLOGICAL CONDITIONS ATTENDING THE DEVELOPMENT OF THE TEETH. By Dr. R. R. Andrews, Cambridge, Mass. Read before the First District Dental Society of New York, March, 1904. In one of the departments of the Peabody Museum of American Archæology and Ethnology—a museum connected with Harvard University—there are to be found some thousands of crania that belonged to a people who inhabited North and South America hundreds of years ago. This is an exceedingly interesting collection to study. An examination of these crania reveals to us the fact that there then existed, to some extent at least, most of the troubles arising from imperfection of structure, irregularity, and decay of the teeth, which we should expect to find in a like collection of crania of a recent people if it were possible that such comparisons could be made.

In contrast to these specimens, there are perhaps fifty skulls in this collection belonging to a people who once inhabited the Sandwich Islands. In these we find a decidedly marked difference in structural characteristics of the teeth. In beauty of form and in arrangement they are as nearly ideal as possible. The teeth are of medium size, the enamel is found to be almost absolutely without pit or fissure, and flowing over the crown, thus forming literally a coat of mail which has protected the dentin absolutely from infection and decay. We naturally ask, Why is there such a contrast between the teeth of these two collections? For ages environment and hereditary influences have been known to influence the development of the tissues of a people. It is a destiny for good or ill given to them by their ancestors. In the case of the early people of the Sandwich Islands, judging them from these crania, we have a perfectly normal development. The conditions of climate, habit and methods of living all enter into a problem of this kind, but we shall not consider these here.

It is my purpose rather to tell you something about the formation of a tissue but little understood even among investigators, which

will show you the causes of physiological or pathological growth in the formation of the teeth. This tissue is called calco-globulin. By it every part of the inorganic structure of a tooth is molded or formed. In describing this, I shall have to speak of the various processes taking place during development. At about the end of the second and the beginning of the third month of intra-uterine life in the embryonic tissue of the jaw we shall find the primary specialization of cells which are to form the dentin germ. It is in no special zone or layer of this connective tissue that the dentin germ is formed, but the formation seems wholly influenced by the contact with an enamel organ first formed. In the presence of this organ the connective tissue cells become stimulated and active. It would appear as though they offered a resistance to its further ingrowth, and from this resistance the enamel organ was made to expand, thus becoming flattened and broadened. The stimulation and activity of the embryonic cells are shown by their rapid growth, which clouds the part at this point, becoming a dense focus of new growth. The tissue is seen to be actively building itself up, and this results in the formation of a papilla, around which the enamel organ is growing like a cap or helmet. This process of new growth is a beautiful illustration of anabolic metabolism.

New cells are multiplying rapidly by nuclear segmentation, and the phenomena which occur during same are very complicated. Briefly, we may say in describing them, that during the first stage the nucleus undergoes changes preparatory to division, resulting in the formation of nuclear segments and the nuclear centrosomes. At the same time the spindle begins to develop. During the second stage the nuclear segments, after the nuclear membrane has become dissolved, arrange themselves into a regular figure midway between the two poles, at the equator of the spindle. During the third stage the daughter segments, into which during one of the former stages the mother segments have been divided by longitudinal fission, separate into two groups, which travel in opposite directions from the equator until they reach the neighborhood of the centrosomes. During the fourth stage reconstruction takes place, vesicular resting daughter nuclei being formed out of the two groups of daughter segments, while the cell body divides into two daughter cells, and so new cells are formed.

The papilla grows to a cusp or cusps, and now becomes the dentin

germ. At the end of the third and the beginning of the fourth month the dentin germ is rather a homogeneous structure. Round cells are very numerous; they have relatively large nuclei and nucleoli. As the germ assumes the cusp shape multiplication of cells takes place around the blood vessels which have grown into the base of the germ, and a jelly-like layer has formed around its outer surface. It will be found that the dentin germ will grow into the depressions of the enamel organ of a premolar or molar tooth, and these growths will become the dental cusps. We also notice that the different layers of the enamel organ are now formed, and that the sacculus is now forming its layers about both enamel organ and dentin germ. When this process is completed these are inclosed in a sac and thus become a dental follicle. Within the area of the dentin germ are contained all of the cells which will develop later into the mature dentin and into the pulp of the fully-formed tooth.

The round cells on the rim of the dentinal papilla appear to be in a protoplasmic substance, sometimes called a zone of amorphous material. It is a hyaline structure on the outermost surface of the germ. The cells just within become richer in protoplasm, and many processes are seen to be forming from them. They are becoming branched cells; a little later the cells at the surface grow larger and assume a columnar shape, which may be caused by mechanical compression. We also see just within this layer of cells some that are pear-shaped, conical, cylindrical, and spindle-shaped. There are some authorities who have spoken of what they call elementary cells on the outer layers, and from which, they say, the odontoblasts are formed, but I have never observed anything but globular masses, which are not cells. They are found in the protoplasmic substance of the rim spoken of above. At the beginning of the fifth month these cells on the surface are seen to be undergoing a histological differentiation, as stated above, and become odontoblasts. They are little more than masses of protoplasm. A marked change has taken place in these cells. As builders of a calcified structure they differ from the surrounding cells; by a peculiar metamorphosis they have become specialized. They now become a physiological apparatus, a sort of chemical laboratory, if you please. In this condition they are unlike other cells, being unable to lead an independent existence. The builders of the calci-

fied dentin and enamel have scarcely any membrane. The power of the cytoplasm of these cells, with its formative activity, creates, with the lime from the blood, minute bodies called calco-spherites. These are plainly seen to differ from the cytoplasm, by which they are placed so that they occupy a definite position of fixed form and structure. Thus it will be seen that the special function of these cells is to absorb the calcific material from the blood. Within the cells it is elaborated, and then given out to the calcifying tissue in an altered form. The calcareous matrix is not formed out of the protoplasmic layer alone. This protoplasmic layer, or protoplasmic exudate, has just previously been given out by the building cells, and now plays the part of an intermediary, by selecting its earthy matter from its environment. It has been stated by a recent writer that the phenomenon of nuclear segmentation takes place in these specialized building cells, but this, I believe, is a mistake. Their function is mainly to build up the calcified tissues. How is this done? This problem we do not wholly understand, nor do we understand the physical or chemical properties of the building materials. At the time of calcification there is a perfect vascular system of arteries, veins and an extensive capillary network near by.

As I have said, the details of the vascular mechanism by which the building cells are supplied with lime necessary to form calcified structure have not as yet been clearly worked out. Capillaries near the building cells do not communicate directly with the cells, and must therefore pass the lime through the intracellular substance. The inorganic calcium which is manifestly necessary cannot be supplied as such by the organic building cells, but must make its initial entrance into the body from without. This entrance in the fetal state must necessarily be through the maternal circulation, and after birth it must come from the food which passes through the alimentary canal. From here it must be carried to the specialized building cells which superintend the process of dentinification, and there is but one such distributor—the blood supply.

After the absorption of food into the circulation by the intestinal epithelium, chemical analysis of the blood shows the presence of two calcium salts, the insoluble phosphate and the soluble carbonate. It is readily understood that the soluble carbonate can be absorbed, but how the insoluble phosphate can be is still a mooted question. It is believed, however, that it is absorbed in that same loose chem-

ical combination with proteid, in which it is found before absorption in the casein of milk and the yolk of egg. Chemical analysis has shown these two foods to be very rich in calcium. The casein and caseinogen of cow's milk, according to Bunge, contains more calcium to the liter than does lime-water. Caseinogen, according to Soldner, contains 1.65 to 2.36 per cent of calcium. The proportion of calcium in combination with the proteid of egg-yolk has been found to be about the same.

The loose calcium-proteid combination arriving, during its passage through the dental pulp-capillaries, within the radius of the special physiologic motive force of the odontoblasts, is acted on by this vital force, and thus becomes ingested by the cells. We believe that it here becomes modified by the cytoplasm of the cell through a chemical combination with its organic substance, and in this way calco-spherites are formed. Within the cells these globules seem to have the property of coalescing, and as they are placed by the cell against the surface to become calcified, they are found to be in many cases large globular or irregular-shaped masses. These masses, merging with others, smooth out and form the layer always found between organic and calcified tissue, where the process of calcification is taking place. This is the layer known to investigators as borderland tissue. Hoppe-Seyler asserts that the lime which hardens dentin and enamel is a double salt of calcium carbonate and phosphate, combining one equivalent of calcium carbonate with three equivalents of calcium phosphate.

The various processes of dentinification have been demonstrated to me by many hundreds of sections cut from developing teeth at a time when calcification was beginning, and from tissue prepared as near the life of the animal as it could be, and prepared with the least possible manipulation consistent with perfect specimens.

The formation of dentin from the dentin germ proceeds substantially in the following manner: We notice that the hyaline substance on the rim of the germ, which is a protoplasmic exudate that surrounds the outer ends of the formative cells, is filling up with minute, glistening, irregular-shaped masses that appear semi-solid, many of them being globular, but all tending to form by fusion a layer of a substance which is involving a portion of the outer ends of the odontoblasts. In this way layer after layer is formed, until the dentin is completely calcified. The layer which

is forming is a new product and a transition tissue. In this condition it is known as calco-globulin; a further chemical change forms it into the fully-calcified structure. Thus the dentin is formed, layer by layer and stage by stage. We cut our sections, if we are studying the forming dentin, at a period of growth covering one of these stages, and in these sections we do not always get the same picture. Sometimes the section will show the globular formative stage, sometimes the stage that shows the continuous band of calco-globulin, and sometimes, though rarely, we get a picture that shows no appreciable layer between the odontoblasts and the calcified dentin.

This borderland tissue, calco-globulin, has its birth only after the substances which form it have passed out of the building cells. Here, by a perfect fusion of the calco-spherites with the protoplasmic exudate, calco-globulin is formed. It is a transition tissue, which is to become calcified. In it the lime is held in some sort of a chemical combination not yet understood. It is retained very obstinately, and is exceedingly resistant to the action of acids, caustic alkalies and boiling water. Investigators do not seem to understand this tissue. A recent author tells us that "calco-globulin, although appearing in the building cells, is really formed in the cells farther away from calcification." The globules that appear in the building cells that he speaks of are really calco-spherites. One who knew what calco-globulin was would not make such a misleading statement. The same author also makes this misstatement: that "the globules of calco-globulin are quickly destroyed by acid treatment." Other authorities have told us that there exists no calco-globulin in the formation of the dental tissues—while all the evidence tends to show that none of the calcified tissues of the tooth could be formed without it. As one layer of this substance calcifies, another forms, and so on. The dentin shows this layer formation especially well during development. This nutritional condition is repeated over and over again, until calcification is complete. Understanding this, one can readily perceive the effect of disease, or of the lowering of the vital forces at this time. Some of the layers are sure to be imperfectly formed. The fusion of lime and protoplasmic exudate is incomplete. Calco-globulin is abnormally formed. Such a condition is always found in rickets and other diseases of infancy. Calco-globulin forming during this period of

dentition is abnormal, and all teeth calcifying at that time are affected, sometimes to such an extent that the tissue is shrunken and shriveled, so that grooves are formed across the faces of the forming teeth, and we have also what has been called rocky enamel.

Our writers have hardly given these facts the importance they deserve. In the process of normal formation the layer of protoplasmic exudate is sometimes very thin, sometimes thicker. When this layer is formed the microscope reveals within the substance of the building cells, and in the region of the nucleolus, myriads of minute, glistening globules. As they are seen near the mouth of the cell some are larger, as though they had merged with others. They are the calco-spherites, and are seen to be pouring out of the cell and filling the protoplasmic exudate, where, by coalescing or fusing with it, they form a blended layer having no appearance of globular formation. The normal structure is completed by every layer forming in this manner, and we have perfect dentin. On the other hand, in diseases of infancy and early childhood, when the vital forces are impaired, the formation of this layer of calco-globulin is incomplete, as I shall show. Whether the substance of the protoplasmic exudate is affected or not by these nutritional changes is not certainly known. Under the higher powers of the microscope it shows no difference in structure. A decreased vitality would probably cause it to be weakened and defective to a greater or less degree. Malnutrition would show its effect here, as well as in the lessened supply of lime from the blood, and the character of the exudate formed during the diseases of early infancy must necessarily be below the normal. I think it fair to assume that the tissue is affected, in that it is formed during a perverted development.

In the formation during disease of a layer of calco-globulin there is a deficiency in the supply of the calco-spherites. They are given in to the protoplasmic exudate sparingly. In it the globular bodies are unevenly fused. Under the microscope we see masses of globules which have calcified as islands, not perfectly filling the substance in which they rest. Some of these globular masses are seen clear and distinct, others are indistinct, as if just out of focus. Some are perfect spheres, others are fused together, having a mulberry-like form. In fact, the alteration of the developmental force is most marked. These imperfectly-formed layers may continue to be formed during the period of the disease. When health

returns normally-formed layers develop, and the imperfect ones are closed in from the nutritional impulses of the receding pulp, and their condition or substance, which is imperfectly formed or transitory, thus becomes an area of abnormal formation. The globular masses in these imperfectly-formed layers are calcified structures. The protoplasmic exudate which surrounds them seems little changed. Some writers speak of it as an interglobular cartilage. The dentinal fibers seem to pass indifferently through both these hard and soft structures. These imperfect or partially-calcified layers exist in the dentin in different degrees. In some sections which we examine they have the appearance of contour markings. In other specimens, which have been formed during the diseases of infancy, the whole substance of the dentin seems to be a conglomorate mass of globules, having the interglobular spaces filled with the interglobular cartilage.

Calco-globulin exists as a much more stable structure in the linings of the dentinal canals. It may remain here as sheath tissue for years with little change. It is formed as follows: As each dentin-forming layer calcifies, the fiber, which has its origin from fiber cells in the pulp, lengthens, and against this lengthening fiber this same calco-globulin layer is formed, as it is against the forming matrix next the building cells. This so-called sheath tissue, then, is formed of calco-globulin. It is a part of the matrix, and is in no sense a separate tissue. Tubes can be demonstrated only after full decalcification, when acids or caustic alkalies have completely destroyed the calcified matrix. In sections of dentin this sheath tissue can be stained by a preparation of silver nitrate. It acts precisely the same as it does on the calco-globulin layer of forming dentin—it stains it black. It is, then, a part of the matrix in a partial state of calcification. Full calcification may take place in this more stable form of calco-globulin as age advances, when the diameter of the dentinal canals is found to be less than in the young teeth.

(Fifty slides were shown on the screen.)

Discussion. *Dr. M. L. Rhein,* New York: In listening to the paper I was forcibly struck with its practical adaptation to us as practising dentists. The matter has been frequently put to me by different medical men relative to the condition of the teeth, especially of rachitic children, and it is in regard to this one practi-

cal question that I might say a word. The paper gives us a most practical lesson there—the malformation and the irregular form, and the lack of enamel deposit, as seen in these children. It is very important that we should be able to inform the parents of such children and their attending physicians of the reason for this condition. There is no excuse at the present day for some of the erroneous statements and assertions constantly brought to our attention as to why these perversions of structure present themselves. A presentation of this kind is an object lesson to every dentist, and enables him to answer the parents and physician properly on these questions.

There is another phase that I want to touch upon, and that is, how to prevent this condition. It has always been my idea that where the dentist has the confidence of his patient it ought to be brought to his knowledge, as well as to the knowledge of the attending physician as soon as the mother becomes pregnant. It is in the early stage of pregnancy that the dentist is frequently in a position to give the most valuable advice to the mother; not so much for her health, but that she may begin to take care of the teeth of the child *in utero*. It is to this phase of the question—from a practical standpoint—that I want your attention directed. I have been told of some of the most astounding recommendations to mothers during this trying period of their life, given to them by physicians, not with the object of bringing into this world children who were normally and physically formed, but to enable the mother to produce those children with as little pain as possible. They have advised the non-use of such food materials as would tend to the production of these calcic formations that Professor Andrews has shown us so clearly to-night bear such an important relation to tooth-formation. I have no doubt that all of you have run counter to this same proposition from some physician—the advice to mothers to abstain from food that contains real nutritional material. It has frequently been a source of extreme gratification to me that I have been able to obviate such a pernicious doctrine as this, and I think it is a very important practical point that we can deduce from the paper.

There is one other point that suggested itself to me in regard to the beautiful elucidation that was given us of the canaliculi, and the necessity of maintaining in those canaliculi, after the pulp has been removed, as far as possible a condition of health if the tooth is to be

retained in a healthy condition afterward; that is to say, as to the nutrition that proceeds from the pericemental tissue, and is a source of nourishment to the dentin after the pulp has been removed. In order to leave a tooth in such a condition, there comes up the one point with which I will close, and that is, the scientific closing and sealing of the root-canal, so that the living portion of the canaliculi shall be maintained intact during the remaining lifetime of the tooth.

Dr. John I. Hart, New York: We have clinically recognized that under certain conditions enamel formation is unnatural, and that the dentin is improperly calcified. Czermak called attention to the spaces described by Dr. Andrews so beautifully to-night, and we have recognized that certain teeth, as they erupted in pairs, presented marked irregularities, while other teeth calcifying at other times were almost perfect. After studying a paper of this kind we can realize how faulty metabolism brought about by impaired nutrition in the individual, or how faulty nutrition in the parent, may interfere with proper deposition of the lime salts. This union of albumin and lime is one of the important factors we have to deal with. If the lime and albumin do not unite properly, then the tissues we work on constantly are not in a condition to resist the inroads of caries. They are not only in a condition where they will not resist the carious process at some point of the enamel, but more particularly in the developmental grooves are they improperly protected against these inroads. If the dentin be improperly calcified, if we have any material amount of these spaces of improper calcification, then in little or no time the pulp becomes involved, and we pass from a mere simple carious process to an invasion of the pulp, and finally it is lost. Unfortunately this happens so frequently prior to the proper completion of the roots of the teeth, that as a class we are losing pulps of teeth which former generations saved intact.

Now comes a question that was evolved by the speaker before me, as to whether we are able to change this condition by giving a different character of food to the mother. There have been many arguments on the other side. It has been shown conclusively that where those very elements were given to the mother, in certain conditions they were thrown off and were not absorbed by the being *in embryo.* So it resolves itself into my first proposition—

proper metabolism—and that goes back to the first principle of life. In this age of nervous excitement, lack of exercise and improper living, we have to improve other factors besides food.

Dr. Henry D. Hatch, New York: I would ask Dr. Andrews why we do not get those grooves which can be observed macroscopically in deciduous teeth? I would like to know also concerning those cases of so-called atrophy in the permanent teeth with which we are all familiar, where a groove as large as the end of a lead pencil will appear, across a pair of incisors, for instance. How long a period of illness or of lowered vitality would it take to produce such a groove as that? Are we justified in saying to the mother that the condition was produced by such or such an illness? Another thing, conceding that, on account of the anastomosis of the terminals of the dentinal fibers, life is given to the dentin by way of the peridental membrane when the pulp is dead, how far toward the pulp can the dentin be alive when the pulp is dead?

Dr. J. F. P. Hodson, New York: I would like our essayist to have interpolated in his finished paper a statement as to what year this formation had taken place; whether it was *in embryo,* or so long after birth, or when the first teeth erupted, etc.

Dr. Andrews: In the case of the deciduous teeth the crowns are formed at birth or nearly so. In the permanent set faulty formation from disease would occur about as follows: Between the first and second year we should expect to find the cutting edges of the central and lateral incisors and first molars affected; the central incisor's cutting edge forms a little earlier than that of the lateral incisor, which we should expect to be less affected. The first molar forms earlier than the central incisor and about a line (one-twelfth of an inch) of that is formed. Between the second and third year the imperfect tissue would be found a little more than a line below the cutting edge of the incisors. It would involve the forming point of the cuspid, and be found on the first molar about one-third the distance between its cusp and the gum. Between the third and fourth year the defect would be found about midway between the cutting edge and the gum. It would affect the cuspid a little more than a line from the point of its cusp, and would affect the points of the bicuspids. The first molars would be affected about half way between their cutting edge and the gum. Between the fourth and fifth year the imperfect structure would be found on the incisors

near the gum; on the cuspid midway between its cusp and the gum; on the bicuspids about a third of their length from their cusp; on the first molar at about the gum line. At this time we should expect to find the cutting edges of the second molar affected. At the sixth year imperfections would be found at the base of the lateral, across the lower third of the cuspid, across midway between the cusp and the gum of the first bicuspid, the upper third of the second bicuspid, and the upper portion of the second molar. At the seventh year we should find imperfect structure at the gum line of the cuspid and bicuspids. It would affect the second molar at this time, midway between its cusp and the gum. At the eighth year disease would affect the lower portion of the crown of the second molar and the cutting edge of the third molar, which at this time is just forming.

In regard to Dr. Hatch's question: Were you speaking of an abraded groove that we find near the gum?

Dr. Hatch: I did not mean an abrasion. I meant that condition where the enamel has never been formed—those grooves spoken of usually as atrophy, where the permanent teeth have never had any well-formed enamel on them—of grooves across the faces as large as the end of a lead pencil, roughly speaking.

Dr. Andrews: That is due to perverted nutrition. While the crown was forming there was weakness or illness which kept the natural forces from working normally. It is impossible to answer those questions absolutely. We have every reason to suppose that such changes are taking place under pathological conditions. They are not natural. I wish I could answer more definitely. I have seen the condition in the temporary teeth—those grooves of disease that must have taken place perhaps from the mother's condition, and not from the child's, or perhaps the embryo's and the mother's together, but we do not see it as often as the other. A tooth forms just so far in a nearly normal condition, then the nutritional forces are impaired from some reason or other, then when health returns the normal tissue will form again, and when the tissue is completed we find the imperfect structure. That is the way the grooves are formed, as seen under the microscope in studying these questions.

Dr. Hatch: How deep can dentin be living if the pulp be dead?

Dr. Andrews: That is a difficult question to answer. I should judge it has a good deal to do with the individual. I do not believe

anybody can state how far live fibrils from the cementum can run in, or what amount of the dentin fibrils are alive. It has to do with the health and condition of the individual.—*Cosmos.*

SERIOUS RESULTS FOLLOWING DENTAL INFECTION. By C. A. Hamann, M.D., Cleveland. Read before the Cleveland Dental Society. These cases are reported in order to illustrate some of the possibilities resulting from an infection originating in or about the teeth. Case I. Mr. S., referred to me by Dr. Price of Kent. The patient, a somewhat delicate man, aged thirty-six years, had been the subject of so-called "nervous prostration" for several years. About three weeks before coming under observation he had had the second lower bicuspid drawn; this tooth had previously been filled. Before extraction of the tooth there was seemingly no trouble with the jaw, but after extraction the jaw became swollen and an abscess burst into the mouth opposite the first bicuspid. This tooth and the lateral incisor were found to be loosened. The inferior maxilla was considerably thickened from the molar teeth of one side to those of the other, and was tender upon pressure; there was an opening through the skin on the right side, through which with a probe one could feel exposed bone; exposed bone could also be felt through openings in the mucous membrane. His tongue was coated, the breath was very foul, digestion was impaired, and temperature had been ranging between 99 and 101. In short, he was suffering from a mild sepsis.

The history of the case, the presence of discharging sinuses through which necrosed bone could be felt, and particularly the thickening of the body of the lower jaw, led me to diagnose osteomyelitis of that bone. Accordingly the bone was exposed by a free incision on the right side (where the process had begun). The outer table of the mandible was necrotic—several loose pieces of bone were removed. The canal for the inferior dental vessels and nerve was full of pus; it was laid open for a distance of an inch and a half. On the left side the outer surface of the bone was normal and the canal was not opened.

After this he did not improve. The left side of the face became swollen, and a parotid abscess formed. I operated upon him twice subsequently, laying open the inferior dental canal from end to end —it was full of pus. At the end of five weeks his temperature had

become nearly normal and the discharge of pus had practically ceased, so that it was hoped he was now out of danger. However, he began to complain of numbness and weakness of his right arm. His speech began to get thick, he had difficulty in swallowing, and his mental condition was not clear. The paralysis became more marked, involving also the lower extremities. He lapsed into a state of stupor, developed convulsions, and died six weeks after the first operation. No autopsy. The cause of death evidently was a metastatic cerebral abscess.

We had in this patient, then, an osteomyelitis of the lower jaw due to a carious tooth, which resulted fatally from cerebral infection. Osteomyelitis of the jaw is on the whole a rare affection. Writers seem to differ as to whether the carious tooth is the source of infection or whether infection occurs after extraction of the tooth. Certainly it would seem that the disease ought to be more common when the frequency of caries of the teeth is considered, and when one thinks of the immense number of extractions, which are often done without precautions as to surgical cleanliness. Traumatism, metastasis and hemogenic infection may also cause the disease. Uusually the entire bone, that is to say, marrow, osseous tissue and periosteum, is involved, so it is better to use the term osteitis. It may be either *circumscribed* or, as in the above case, diffuse. The latter is of course the more serious—indeed is usually fatal—due to sepsis, or metastatic abscesses or sinus thrombosis. The lower jaw is more often involved than the upper. The bone is thickened—tender upon pressure—the teeth are loosened—and bathed in pus. The face is swollen; the constitutional symptoms are those of sepsis, which it is needless to mention. Stress is to be laid upon the loosening of the teeth as a diagnostic sign. The treatment is that of osteomyelitis in general—free incisions, thorough drainage and the removal of sequestra. In cases that recover an unpleasant sequel is often seen in the shape of cicatricial closure of the jaw, from the infiltration of the muscles, particularly the masseter.

Case II. A. K., age thirty-five, was admitted to Charity Hospital on June 14, 1902. He had a diffuse submaxillary swelling, both sides being indurated and reddened, and had a high temperature (ranging from 100° to 104°). There was extensive pyorrhea alveolaris—all of the teeth being involved—one could force pus from the sockets. The source of infection evidently was this suppurative process about the

teeth. A couple of incisions were made in the neck, but no pus was found. Subsequently an abscess formed over the left parotid, and in the pus were found streptococci. His temperature continued to be elevated. On June 26 it was noted that his left eye was protruding. The next day there was exophthalmos of the right side, also chemosis. It was then certain that he had thrombosis of both cavernous sinuses. Delirium soon set in. He had repeated chills and died on June 30. An autopsy, made by Dr. Parker, revealed the presence of purulent thrombi in both cavernous sinuses, also in the circular and transverse sinuses and in both ophthalmic veins. There was pus in the right orbit and also in the subarachnoid space at the base of the brain. To summarize, in this case there was a suppurative affection of the sockets of the teeth, resulting in submaxillary and parotid infection, followed by septic thrombosis of the cavernous sinuses and death.

Case III, which I will not report in detail, was very similar to the above. The patient was seen in consultation. He had thrombosis of both cavernous sinuses, due to an infectious process extending from suppuration about the teeth, pyorrhea alveolaris.

What is the path that the infectious process follows in these cases of extension from the teeth to the cavernous sinus? The veins which return the blood from the teeth pass to the pterygoid plexus, which is situated about the pterygoid muscles, and in the fat of the cheek. This plexus communicates with the cavernous sinus by means of small veins which pass through the foramen vesalii, foramen lacerum medium, foramen ovale, and along the internal carotid artery; in addition to this there are communications between the plexus and the inferior ophthalmic vein through the spheno-maxillary fissure; the ophthalmic vein empties into the cavernous sinus. The facial vein also communicates with the pterygoid plexus by means of the deep facial vein, and with the ophthalmic vein at the inner angle of the orbit.

Given then a suppurative process about the teeth, such as pyorrhea alveolaris, an alveolar abscess, or indeed any septic process about the jaws or face, it is easy to see how extension to the sinus may occur. If the sinus is thrombosed the ophthalmic vein of course cannot empty itself, and consequently the blood is retained in the orbit; edema, and infiltration of the loose orbital tissue, with serum and perhaps pus, cause the eyeball to be protruded and chemosis to

appear. Furthermore, inasmuch as the two cavernous sinuses communicate by means of the circular and transverse sinuses, the opposite sinus from the one first involved becomes almost necessarily thrombosed, and the second eyeball is pushed out. This consecutive involvement of the eyeballs, *first one and in 24 hours or more the other, is pathognomonic of cavernous sinus thrombosis.*

It may be well to mention the ocular changes produced by cavernous sinus thrombosis. The most striking phenomenon of course is the protrusion of the eyeball. The lids are swollen, bluish and edematous, and there is chemosis. The pupil is dilated and immovable, and the motion of the eyeball is limited, from pressure upon the motor oculi, which lies on the outer side of the sinus. Optic neuritis, photophobia and diminution of visual acuity may be present.

The first case of thrombosis of this sinus upon record was reported by Castleman and Ducrest in 1840. Recently Dwight and Germain have collected 178 cases and added four of their own. In going over the literature of this subject I have found the following causes of the affection mentioned, in addition to suppurative processes about the teeth and extraction of these organs; otitis media, with extension to the mastoid process and adjacent sinuses, caries of the sphenoid and ethmoid bones and disease of their sinuses, facial carbuncles, erysipelas and other septic processes in the area drained by the facial vein, infection of the orbital connective tissue, sarcoma of the orbit, and necrosis of the cranial surface of occipital bone.

The diagnosis of the condition is easy. Perhaps the only processes that could be mistaken for it are orbital cellulitis or abscess, tenonitis and panophthalmitis. All of these may produce practically the same signs, and indeed may be followed by sinus thrombosis. In differentiating between these conditions the main reliance must be placed on the cause of the affection. When there is an inflammatory process in the orbit there will be found some local cause, as an injury. The appearance of exophthalmos of the opposite side is, as previously stated, pathognomonic of sinus thrombosis. Cavernous sinus thrombosis is practically aways fatal—*i. e.,* septic thrombosis is.

Can anything be done for it? It would naturally occur to one familiar with the Hartley-Krause operation for the removal of the gasserian ganglion to resort to this method for the exposure of the cavernous sinus—to open it—remove the clot and pack the cavity. I have found four cases in which this was done, either by the above

method or analogous procedures. Hartley in one case removed fragments of a melano-sarcoma from the sinus, and the patient lived about three months. Dwight reports a case which was unsuccessful. Voss records a case in which he exposed the sinus by Lexer's method of reaching the gasserian ganglion (temporary resection of the zygoma). The patient died. He suggests that if the origin of the thrombosis is in the orbit Kroenlein's osteoplastic resection of the walls of the orbit be combined with this method. Bircher in 1893 recorded a case, the only successful one, of septic thrombosis in which he opened the skull above the external meatus, removed the petrous portion of the temporal bone, and then evacuated the clot. There is then some chance of a successful operation, though it might be necessary to open both sinuses.

Fatal sepsis following the extraction of teeth occasionally occurs. Several years ago I saw a case of this sort. There had been an alveolar abscess and an upper molar was extracted. The patient developed a thrombosis of the cavernous sinus, the course of the disease being in all respects similar to that of the one previously described.

That the neglect of the now well-recognized precautions in regard to surgical cleanliness is responsible for some of these deaths cannot be doubted. It is needless and would be presumptuous on my part to insist before this body of dentists on the importance of antisepsis and asepsis in dental operations. Dentistry has shared with general surgery the vast benefits resulting from the carrying out of the principles inculcated by the immortal Lister. It is not possible in the oral cavity, however, to carry out to perfection the procedures which are practicable elsewhere, inasmuch as thorough sterilization is not feasible. Furthermore, septic absorption and the extension of the infectious process have already occurred before the patient seeks relief.

In dental manipulations it occasionally happens that small punctured wounds of the lip or cheek are inflicted by the slipping of an instrument. In ninety-nine out of a hundred such accidents there is no ill result, but once in a while infection takes place, and there is extensive swelling and edema of the face, as I saw in one instance.

Infection through carious teeth is a very common cause of tuberculosis of the cervical lymph glands, and statistics showing this have been collected. This affection is, as you know, most common in

childhood. The submaxillary lymph glands receive the lymph from the teeth, and if cavities are present in the teeth they are very apt to contain tubercle bacilli as well as other germs. Medical men commonly overlook the teeth as infection atria, and I am confident that much could be done in preventing glandular enlargements by attention to the teeth of children.

The presence of pus in the alveoli or gums may lead to general septicemia. In that very common affection, pyorrhea alveolaris, there may be a chronic form of blood poisoning—the source of which is not recognized by the physician. Some of the cases of so-called crypto-genetic septico-pyemia are due to dental infection. It has always seemed strange to me how persons escape septicemia and why we do not see more instances, when we consider the large number who have these foci of suppuration. In dispensary practice one is impressed with the filthy condition of the mouths of a great many, I might say the majority, of the patients.—*Summary.*

RADIOTHERAPY IN SOME MALIGNANT CONDITIONS OF THE MOUTH. By Milton Franklin, M.D., New York. Read before the New York Institute of Stomatology, June 3, 1904. The now almost universally accepted theory of the action of the X-ray upon the human organism supposes that in all tissue exposed there is effected a high degree of stimulation, which, when continued for a time disproportionate to the resistance of the affected tissue, assumes the proportions of an inflammation of gradually increasing severity, finally ending in sloughing and necrosis. Whether the tissue be normal or pathological, whether the result be beneficial or destructive, the action of the ray is the same, and can be said to differ only in degree. Assertions that there exist a distinct curative and burning action are erroneous.

A consideration of the phenomena which occur in an area that has been exposed to the action of the rays will elicit the fact that they strikingly resemble in character and sequence those of typical classic inflammation. There is the same congestive hyperemia, followed by the slowing of the blood-current, diapedesis, and vascular exudation, with their accompanying alteration in the vascular walls. There is the increased flow of leucocytes to the part and the infiltration of the tissues by them. These changes are followed in

turn by the other well-known changes of inflammation, and may extend through the stages of fibrinous exudation or even to the formation of pus followed by necrosis with sloughing. The causes of inflammation are various, such as traumatism, the action of strong chemicals, heat, electricity and the X-ray. Each of the different causative agents gives rise to a somewhat different train of phenomena, and while the course of inflammation is in the main the same in each, the different causes may be generally recognized from the resulting inflammation.

So also in the case of the X-ray, there are certain peculiarities which render the character of the inflammation slightly different from the rest. This difference, as far as can be deduced from facts thus far known, consists in that the action commences generally only after a varying period of latent inactivity, that the effect seems entirely due to action upon the nerve terminals, and that the resolution of the scar so closely resembles that of healthy tissue that it is unlike any class of scar heretofore observed, both in absence of tissue loss and of tendency to hypertrophy.

Besides this action in causing inflammation through direct stimulation, there is the almost paradoxical coincident inhibitory effect upon lower forms of cell life. This action has been so certainly established that I shall not attempt to detail the experiments which have led to a knowledge of the fact. In the main these effects are common to the X-ray, the ultra-violet ray as applied by Finsen, and to the emanations of radium. In the case of the X-ray the destructive action is dominant; with the ultra-violet ray there seems at the present time to be strong reason to suppose that the germicidal factor plays no inconsiderable part, while the ability to cause the growth of almost normal new tissue in the area formerly occupied by the diseased tissue is quite remarkable, excelling even that of the X-ray. In the case of radium there has been so little evidence up to the present time that is likely to prove of any therapeutic value, that I shall not consume the time or space necessary to discuss it. At the same time it may be well to point out that on account of the small size of the tubes, combined with their independent activity, apart from any connection with an outside source of electricity, they may prove of interest in conditions of the mouth if they are ultimately found to possess any value in medical science.

In considering which method to use when dealing with a malig-

nant condition much judgment should be exercised. The disadvantages and limitations of operative procedures should be carefully compared with those of the X-ray, and the method chosen which, in the case under consideration, offers the greatest number of advantages and the fewest disadvantages. In the treatment of diseased tissues with the X-ray it should be remembered that all tissues are affected in the same way, the action being the same upon healthy as upon morbid tissue. The different effects are attributable in the main to the lower vitality of the latter. The changes that are gone through follow each other with comparatively greater rapidity in the less resisting tissue, while the normal tissue is but mildly stimulated. Thus the stage of sloughing and cell proliferation may be reached in the tumor, while in the adjacent healthy tissue, equally exposed, there may be only mild irritation, or at the most burn of the first degree. At the same time the retarding action upon lower forms of cell life should be taken into consideration as probably inhibiting the growth of the neoplasm.

The advantages of surgical measures over the X-ray may be briefly summed up as follows: 1. Celerity. The whole diseased area as well as the threatened tissue may be removed at once, while in the case of the ray weeks, months, and in some few cases a year or even more have been necessary. 2. Conservation of the patient's strength. By removing from the body at one operation the whole malignant growth a great drain upon the patient is avoided, together with the constant danger of metastasis. 3. The removal of the growth from the body by an outside route instead of causing it to be eliminated by the body organs, with the consequent accompanying autointoxication from the presence of the degenerated noxious tissue products. The strain upon the eliminating organs and the danger of metastasis, which it is now generally accepted are increased by the action of the ray, are avoided.

The considerations in favor of the ray method are briefly as follows: 1. Avoidance of surgical shock and anesthetic complications. 2. Better ability to differentiate, and assurance that only the diseased tissue will be destroyed. 3. Better appearance of the resulting scar, which in the majority of cases so far resembles the normal tissue as to almost entirely escape detection.

Considerations of locality will in a measure determine which of the two methods is to be preferred in some cases, it being remem-

bered that the ray cannot be focused, and that the tissue surrounding the area to be treated should be protected as far as possible from its action. In deep-seated conditions the ray as a curative agent cannot be too strongly condemned. The necessity of traversing healthy tissues by the inflammatory rays subjects them to the great danger of burn, with the accompanying inflammatory changes. Besides this, the delicate nature of the lining membranes of the viscera renders them liable to so great irritation as to endanger life. Finally, there is no authentic case of cure of deep cancer at present extant.

The determination of which method is to be used in any instance should be based upon a consideration of the features of the case in connection with the characters of the methods available. In general terms cases in which the X-ray is to be recommended are those in which (1) the condition is essentially superficial; (2) where the loss of any great amount of tissue would be serious; (3) where there is little likelihood of other organs being involved through metastasis; (4) where cosmetic considerations outweigh all others; (5) where time is a negligible quantity and does not add danger, and (6) where the case is for any reason inoperable. In general all other cases are preferably treated by operative methods.

I make mention here of only those conditions of the mouth in which, in my opinion, there is nothing to be gained by employing the radiotherapeutic in preference to the operative method. There are numerous other cases where either some difference of opinion exists, or the ray is generally accepted as inapplicable. Epithelioma of the mouth, when situated on the edge of the lip, is frequently better treated with the ray than by other methods. Here the loss of tissue should if possible be avoided. The condition is among the most amenable to treatment by the ray, and the superficial character renders it more so. In cases where there is much involvement of the submaxillary glands, while it is the experience of some practitioners that the size of the glands decreases simultaneously with that of the lesion, it is better practice to extirpate the whole of the threatened and diseased tissue and then apply the ray for the purpose of preventing recurrence. Where the epithelioma involves the tongue it is preferable to use the rays where conditions do not specifically contraindicate. Here any loss of tissue is followed by grave consequences, and the results in cases that have been treated

by the rays have been such as to render the method of unquestionable value.

In cancer of the larynx or pharynx, notwithstanding some reputed cures, it is certain that there is little to be gained by using the ray. Because of the impossibility of applying the rays direct, but only through the tissues of the neck, it is doubtful if any benefit can be obtained without seriously impairing the tissues traversed. The ray may be used after the operation to lessen the likelihood of recurrence. This is in no way inconsistent with anything that has been said regarding the danger of raying deep-lying structures, as it is necessary to apply the rays only a few times to obtain reasonable assurance.

In noma the results of raying have on the whole been of negative character. Here the utmost despatch is needed in ridding the mouth of the offending mass, as any delay is apt to result in irreparable loss of tissue or even of life.

Catarrhal and croupous stomatitis, though not malignant diseases, are worthy of mention here because of the striking manner in which they respond to the ultra-violet treatment of Finsen. In the former condition the degeneration of the epithelium and the formation of pus cease after a few treatments, and the substitution of a new membrane follows speedily. In the croupous condition the false membrane melts away under the action of the light, and is followed by no perceptible scar. Where there has been tendency to necrosis there appears a cicatrix after the cessation of the morbid process, which closely resembles the normal tissues.

Tubercular stomatitis is readily influenced by the ultra-violet ray, and as there is rarely any communication of the process to other parts of the body, there is little danger in a prolonged treatment. It is therefore preferable to proceed by phototherapeutic methods instead of resorting to operation. The X-ray also exercises a marked benefit upon these cases, but on account of the danger of burning the face the ultra-violet rays are to be preferred.

Papillomata are best treated by the X-ray when they are of small extent, and by operation when large. The ray is recommended, as the results are obtained in small tumors before the lining membrane of the mouth is affected, and in these cases this method is simpler than operation.

Angiomata respond very readily to the action of the X-ray, the

internal walls of the vessels undergoing a change resulting in early occlusion, followed by atrophy and final disappearance of the whole mass. The elaborate measures necessary to prevent excessive bleeding in all operations render them less to be desired in these conditions.

To conclude: It may be stated that in the present condition of the science the radiotherapeutic method may be used on some few cases in preference to all others; in some cases where the operative method, other things being equal, would be preferred, but in which on account of existing complications cannot be performed, and in nearly all cases, after operation, to minimize the possibility of recurrence. Regarding the value of the ray in post-operative cases, for the purpose of minimizing to the fullest extent the likelihood of recurrence, it may be stated that herein lies the most satisfactory feature of the whole method. Scarcely any difference of opinion exists at all among surgeons who have made a practice of having their cases undergo a course of X-ray exposures after operation, as to the influence in preventing recurrence.—*International.*

BETTER DAYS, OR THE DENTIST OF TO-MORROW. By Frank L. Platt, D.D.S., San Francisco. Read before the San Francisco Dental Association, July 1, 1904. A few years ago there was published a book entitled, "Better Days, or a Millionaire of To-morrow." But that there may be no opportunity for the charge of plagiarism to rest against the title of this paper, it will only be necessary to call attention to the fact that so far as known there is no relationship between millionaires and dentists, and so little likelihood of either one ever becoming the other that the charge, if ever thought of, must be at once dismissed.

As this paper is written in what may be termed a spirit of prophecy, it will be necessary to review briefly some of the propositions from which the final conclusions are deduced, so we will first hold up for analysis the dentist of to-day. As the dental profession is now organized, recruited and maintained, the modern dentist may be either a well-educated man, familiar with good literature, accustomed to polite society, trained to think and act intelligently, to reason from cause to effect and from effect to cause, possessed of a keen appreciation of the uses, abuses and necessities of his profes-

sion, and actively interested in everything pertaining to the health and comfort of his patients, and the ethical development of himself, socially and professionally. Or he may be an uneducated, illiterate man, incapable of appreciating in any degree the nicer sentiments and higher ambitions of his peers, dominated by but one purpose, that of making a living, and caring but little what means he employs to attain his object. Or he may be a representative of the great mass of practitioners, fairly educated, possessed of a greater or less degree of manual skill, having sufficient professional pride to avoid any flagrant violation of the code of ethics, valuing dental literature highly enough to subscribe for one or two dental journals, and having enough interest in his profession to occasionally attend a dental meeting, though he may not contribute to its program, but nevertheless practicing dentistry to make a living, and handicapped always in what might be attempts toward the attainment of higher personal and professional ideals by the inevitable recurrence of collection day and the fact that each month there are just so many obligations to meet and only so much time in which to prepare to meet them. He is also oppressed by the fact that to the general public all dentists look alike, and that a certain value in dollars and cents eclipses all other considerations when his work is held up for scrutiny and analysis.

The fundamental object of all effort which is productive of anything excepting pleasure, is the maintenance of existence, and no amount of culture or ethical training can change this primary condition, except in its method of application as manifested in the evolution of the human race, for just in proportion as man advances in civilization so does he lighten the burden of his existence as imposed on others and also on himself. In the animal kingdom life is maintained only at the cost of continual warfare, or the practice of animal cunning, and it is but a step from this state of existence to that of the savage who lives in much the same manner and by the practice of the same rules of existence. Civilized man from his proud estate looks with disdain on his savage brother, and yet in many instances maintains his existence only by the practice of arts and wiles, made more subtle and effective by his superior intellect, but differing only in this degree from the methods of the savage and the animal. Men of this type in professional life are exemplified by those who exist by preying on the credulity of their fellows, who offer something

for nothing, who advertise skill, or wares, or knowledge they do not possess; they are the savages, if you please, of our professions.

Considering the fact that modern dentistry is but little more than a century old, that dental colleges and dental literature have existed for even less than three-fourths of that time, and that until recently in many of our states the professional doors were open to all who might enter, it is not surprising that abuses have crept into the profession and that all the varying classes of men to which we have referred are represented in our ranks. Nor it is strange, considering the diversity of types brought together in our professional family, and the quality of competition which the struggle for existence generates in them, that a spirit of pessimissm seems to be abroad, and that frequently the pages of our journals record the idea that dentistry is retrograding. Only recently someone wrote an article entitled, "A Man Is Foolish to Practice Dentistry," and sad to relate, he seemed to sustain his argument fairly well.

If dentistry to-day is not all it should be, if it lacks those qualities which make other professions more desirable, if indeed it is retrograding, we must remember that it is just what we have made it and that we are responsible for its unhappy customs, precedents and general reputation. If the great majority of dentists to-day are not all they should be, in point of education, skill, professional pride and power of accomplishment, if a great portion of modern dental operations are poorly performed, if thousands of fillings are poorly made and more poorly finished, if thousands of crowns are placed where no crown should be, and thousands of others are poorly made and illy fitted, and if most of these operations are performed for a fee for which the patient should expect no more than he receives, we need not be discouraged nor think for a minute that our profession is going to perdition. We simply see in these signs of the times the symptoms by which a proper diagnosis of the diseases of the professional body may be made. We are living in the age of dollars and cents, but at the same time in an age where educational effort is making greater strides than at any previous period of the world's history, and it is only a matter of time when the effect of all this effort will be seen and appreciated.

Abuses grow and flourish until the time comes when they are no longer endurable, and then they are abolished, and so it will be with the abuses in our profession, for in the course of time the

public, which in some localities is just beginning to wake up to the fact, will realize how important a part the teeth play as regards the health, happiness and development of the race. They will realize also that first-class professional services are the only kind worth having, and that they are worthy of a proper fee. The time will come when the individual seeking the services of a dentist will no sooner dictate the sort of operation he wishes performed, or the materials to be used in its execution, than he will dictate to his physician the particular sort of drug he wishes prescribed for the cure of his bodily ailments, and as this much-desired state of public intelligence approaches, a corresponding change in the personnel of the dental profession will be noticed.

Our medical and dental colleges will in the course of time become state institutions, as it will be found that private corporations, governed in too many instances by the financial views of their promoters, are not fit institutions to pass judgment on the qualifications of those who are to minister to the health of the public, on whose strength and vigor rests the durability of nations. From these state dental schools will be graduated men who must have demonstrated by the end of the first year their natural fitness to pursue the course of study they have undertaken. The entrance requirements will include a degree in art or letters from a state university and a diploma from a school of manual training. Under such training and education the dentist of to-morrow will be a clean, honest gentleman, who will realize the fact that the dental profession is too important and too beneficent to be treated as a trade or the catch-penny device of the street fakir; he will realize that his art demands all the energy and study and skill he may command, and that to spend less than this upon it is disgraceful, ruinous and criminal.

Do you ask when this dental millennium will be reached? It will not be long after each member of every dental society determines to perform every operation entrusted to him just as well as he knows how to do it; when every cavity shall be prepared correctly, and every filling well made and finished; when every operator will refuse to work for a fee which will not allow him to perform each and every service for his patrons in the best manner of which he is capable; when we have made of dentistry a profession which need not ape any other in courses of study or claim to be a part of any other profession, but a profession grand and good and solid enough to

stand alone, and practiced by those who value its worth and their own integrity to such a degree that no dishonest, slipshod methods will be considered, who will work and live decently and discharge creditably their duties to the profession and the public as men, practitioners and citizens.—*Gazette.*

A PLEA FOR THE LONG CUSP IN DENTAL PROSTHESIS. By Dr. Stewart J. Spence, Chattanooga, Tenn. Before the advent of Bonwill's articulating frame the dentist had just cause to shun the long-cusped porcelain tooth, knowing its tendency to dislodge the plate when occlusion would be made in any but the one position permitted by the old-style articulator. Though perhaps awake to the better masticatory power of the long and sharp cusp, the dentist sacrificed the benefits to be derived therefrom in order to conserve stability of the plate. With the advent of the Bonwill system of articulation the necessity for this precaution ceased to exist.

In nature the cusp is usually long—long, that is, compared with that of the average porcelain tooth. Nature's law seems to be that the buccal cusp of the first upper bicuspid shall be as long proportionately to the cusp of the cuspid as this is to the lateral incisor, measuring this last from its incipient cusp. As the cuspid is essentially a carnivorous tooth, it would seem that its neighbors, the bicuspids, were also intended by nature for eating flesh rather than vegetables—that is, for tearing rather than for crushing, and their forms and manner of occlusion show that they are specially adapted for stretching and tearing food. Especially to the flesh-eater, therefore, is injustice done by depriving his porcelain denture of the cusps of the bicuspid. It does not, however, follow that the vegetarian is bettered by this practice, for nature's bicuspid is also a better crushing apparatus than are the flat-topped pegs to which porcelain bicuspids are often reduced by the grindstone.

Relation of the Forms of Bicuspids to Mastication. To help us appreciate these facts let us study the forms of these teeth, their occlusions, and the motions of the mandible. We will take up especially the bicuspid. In the act of mastication the first motion is a descent of the lower jaw, and simultaneously an excursion by it outward on one side and very slightly forward. No mastication

of food is done in this motion. The food is then pushed by the tongue between the thus separated teeth, and the mandible performs its incursion by first closing somewhat vertically upon the mass of food, and then proceeding inward in a more horizontal direction. As the food becomes softened by mastication the excursion becomes less extended outward, and the closures become more nearly straight up and down. While the lower jaw is making the incursion in this somewhat horizontal direction, the bicuspids perform the first part of their act of mastication by stretching and tearing the food—as the buccal cusps of the lower bicuspids pass inward through the spaces between the buccal cusps of the upper bicuspids and the cuspid, stretching and tearing the food in their passage. This being done, a second and somewhat similar act immediately follows. The said lower bicuspid cusp falls into a basin formed in the occlusal surface of the two upper bicuspids by their four surrounding cusps and by two eminences—extensions of these cusps—which stretch across the occlusal surfaces of these teeth from cusp to cusp. (They virtually stretch across, though usually separated by a narrow valley near the center.) As the lower cusp falls into this basin the food is further stretched over these two eminences and the four cusps which tower up at their extremities, and thus once more the food is rent. Besides the stretching thus applied as the cusp falls into this basin, there is a simultaneous grinding and crushing action, as of a close-fitting pestle entering a mortar; and thus these teeth exhibit a double device for stretching and tearing food, with a mortar-and-pestle attachment for grinding it. To cut away the cusps entirely is to ruin this splendid device, and even to cut away these occlusal eminences while sparing the cusps is to sacrifice their contribution to the stretching and tearing action, as well as to largely lessen the crushing capacity by converting the mortar into a trough, which latter is a shape less fitted for crushing when used in connection with a cusp or pestle. It is obvious that the longer the cusps, and the deeper the intercuspal space and the occlusal basin, the more will the food be stretched and torn in mastication.

When we contemplate the splendid, divinely originated device of nature for masticating food exhibited in the human bicuspids, and then contrast it with the flat-topped pegs so often turned out by the ruthless grindstone, our souls rise up in protest against such desecration of nature's sublime ideals.

Shape of Bicuspids as Affecting Stability of Artificial Dentures. While none can question the superior masticatory ability of the naturally shaped bicuspid, the question arises—is it permissible in dental prosthesis?—will it not tend to instability of the plate? Even those of us who agree theoretically that it is correct to follow nature's leadings, and who have adopted Bonwill's system, seem to be timid in venturing out nature's whole distance, if one may judge from several articles which have appeared in the journals during the past few years. For instance, Dr. Geo. B. Snow expressed himself afraid of the "long underbite," deeming it a menace to stability of plate. Another writer advocated the grinding out of the occlusal groove so as to reduce it to a trough. Now, while all must respect the genius of Dr. Snow, I am tempted to question his position in this particular, and I decidedly object to the obliteration of the occlusal eminences. While admitting that a plate with long cusps is more apt to be displaced while making the incursion, especially if nearly horizontally, I deem it evident that the superior masticatory power of teeth with long cusps and deep occlusal basins is so great that it is better the patient should be supplied with these even if he be thereby forced to abandon some or even all of his natural lateral bite and resort to the vertical closure only. And this is so because, as is self-evident, the long cusps and deep basin must be very efficient in tearing and crushing food, *even if only the vertical closure be made.* It is equally self-evident that the lateral closure, when made with cuspless teeth, must be but little more effective in mastication than when the vertical closure is made with similar teeth, because there is nothing in the flat tooth in the way of a raised portion to arrest and hold to place the food, and it tends to slide with the laterally moving tooth. Patients complain that the food slips out from beneath such teeth. And with those very difficult cases, where the lower ridge is gone, which do not admit of any lateral motion at all, not even with flat teeth, it is obviously better to give the patient a denture which can, even with only the vertical bite, to some degree stretch and tear his food, as well as crush it, than to give him one which can only crush it, and which does even that less efficiently than does the other.

The only other ways in which dislodgment of a plate by mastication can occur are two: First, a bite on one side of the mouth may tilt the plate loose on the other side, or if the bite be made by the

incisors the loosening may occur at the posterior border. Second, a cusp or a tilted tooth—such as a lower second or third molar which has moved forward—may strike in closing against the side of another cusp or any inclined surface, so as thereby to shove the plate out of its place.

I think it can be shown that the first of these two forms of displacement is less liable to occur with long-cusped than with cuspless or short-cusped dentures, and that the second cannot occur at all if Bonwill's mode of articulation be followed. With regard to the first: With long cusps, when, say, tthe lower *right* bicuspid is at that part of the incursion when its buccal cusp is passing between the two buccal cusps of the upper bicuspid, then—if the case is correctly set up—the palatal cusp of the upper *left* second bicuspid will come in contact with the mesio-buccal cusp of the lower first molar, and this contact will prevent the loosening of the plate on the left side, although biting may be going on at the right side. At least the tendency to displacement is much less. This is so because the contact of these two left cusps takes place while the jaws are not yet fully closed, but are still held apart the length of one of these cusps, which separation allows a space on the right side for the food in a yet not hard-pressed condition. But if these cusps are ground away, it is evident that before the plate can obtain the support to be had from contact of the teeth on the left side, the occlusal surfaces of the teeth on the right side, where the food is, must come into actual contact with each other, which they cannot do until they have bitten entirely through the food, the which, especially if it be tough and not easily penetrated by blunt surfaces, would tend to dislodgment of the plate by loosening it on the other side. For this reason, therefore, even if it had no use in mastication, this palatal cusp of the upper bicuspid ought not to be removed.

With regard to the other above-mentioned means of dislodgment of the plate: This shoving aside by a point striking an inclined surface cannot occur if teeth are set up on the Bonwill articulator with proper regard to their four normal occlusions. These four are: The protruded mandible when both condyles move forward until the incisors meet tip to tip. The two lateral bites, when one condyle remains in its socket and the other moves forward to right and left respectively; complete occlusion, when both condyles are in their

sockets and the jaws closed. The only other possible occlusions are those made when the mandible is protruded farther than is needed for the tip-to-tip occlusion of the incisors, and then, when thus protruded, it is also moved laterally to right or left; but as these positions are never assumed in eating they are not factors in the problem of plate-displacement.

From these considerations it appears evident that—except, perhaps, for the very aged—the long-cusped denture, because of its greater efficiency in mastication, is to be preferred to the cuspless one, because its points can be so arranged as not to interfere with other points in the various normal closures of the jaws, but on the contrary, to so come in contact as to tend to preserve the stability of the plate, and because if either cusps or lateral movement have to be abandoned, it seems better to sacrifice the latter.

In bridgework there is not even the small excuse for uncusping the teeth that there is in platework, because in bridgework they are firmly retained in place, and yet it is a fact that large and costly bridges are often inserted without any regard to their efficiency as masticatory organs, judged from the Bonwill standpoint.—*Cosmos.*

CONTINUOUS GUM DENTURES. By L. P. Haskell, D.D.S., Chicago. I think possibly from my fifty years' experience in this work I may be able to assist a recent writer in the *Brief* to simplify in some measure his method of constructing the work he has described. Starting from the swaged plate, it should be worn as high as possible all around, but highest over the cuspids and the gum the fullest. Turning the margin of a plate is a slovenly method in any case, but if the plate is trimmed to its proper height, which should be done by the mouth, there is no room for bending the plate. Instead of half-round wire use a flat wire, by passing through the rollers an 18-gauge round wire to 22 gauge, this to be soldered edgewise, filing one edge flat.

The posterior margin of the plate should be doubled after it has been fitted to the mouth, with a strip one-quarter inch wide and gauge 30, extending it around the tuberosities, the inner margin to be turned up slightly to protect the edge of porcelain between the tuberosities and the wire to connect at those points. The object is threefold, namely, to strengthen the plate; to leave a clear margin and a thin one for any relief that might possibly be needed at any

time without marring the porcelain, and to protect the margin of the porcelain.

The backings, which the writer terms "strengtheners," should have a foot-piece bent at right angles, with slits in them, so as to easily adjust to the plate, which the more firmly solders them to the plate. The pure gold must be rolled very thin and cut in pieces and placed under the foot-pieces, and a piece under each pin, no borax being needed. The pieces should be lapped over the cuspids and gold laid between to unite them.

It is not necessary to shellac the teeth to prevent etching.

I have no such experience as warping of plates when a proper gauge of metal is used and the "doubler" added. Neither have I ever found it necessary to pack broken pieces of porcelain under the teeth. The porcelain is first applied thin and jarred well into the crevices between and under the teeth, absorbing with an old linen napkin. Then, absorbing most of the moisture from the mixture, apply it thick, packing hard, as there will be less shrinkage and the body more dense. Partially dry over the burner, and with a quill toothpick, which is far superior to a steel instrument, and holding the case, as in packing, upside down, trim around the necks of the teeth and also between; dry, and using a stiff dry brush remove all chips; then using a small camel's-hair brush, wet and pass around the neck of each tooth.

Dry over the burner and apply with the curved end of a proper spatula material to the palatal surface, first around the teeth and then to the palate, holding the case at first with the front of the teeth towards you. At this point some artistic work may be done by contouring the porcelain at the necks of the bicuspids and molars, instead of leaving the gum at the square, short shoulder of the teeth. The cuspid teeth can be contoured on the lingual side like nature.

I used an oil furnace for one year, but when the electric oven came I purchased one, and now prefer it to the oil. The heat should be brought up gradually and the case fused to a good glaze, more than a biscuit. I transfer it at once to a cold muffle—no danger of teeth cracking. The second coating of body is now applied, first wetting the case thoroughly and applying the material very wet and jarring it into the crevices. Then absorbing, apply thicker, packing hard, trimming as before. The rugæ can now be formed and case again baked, but to a gloss, placing again in the cooling muffle, one of the large oil or coke oven sort. Gum arabic is not at all neces-

sary in the water. There is no necessity for cutting slits in the material, as there is no distortion of the plate, at least in my long experience.

I am surprised to learn that Philadelphia is so far behind in this twentieth century as not to be using to any extent the only ideal, perfect denture, for there is a class of cases where it is absolutely impossible to insert a natural-looking artificial denture—the short upper lip and prominent jaw, because a porcelain gum is an absolute necessity, but it must be very thin, high, and without seams.

There is a great deal of the work being made in this region, though I am sorry to say some of it made at dental laboratories is put together in a very slip-shod manner, so as to make it cheap. Sooner or later much of it will prove a failure. Too much pains cannot be taken to make it strong, and its strength is in the foundations, the metal part.—*Brief.*

CONSERVATISM IN THE TREATMENT OF LOOSENED LOWER INCISORS. By Chas. C. Chittenden, D.D.S., Madison, Wis. The attention of the dentist is frequently called to the distressing annoyance and suffering of patients of middle age by the loosening of one or more of the lower incisors. The patient too frequently delays presenting himself until after he has known of this loosening and infirmity for a long time, and has perhaps been avoiding bringing into use the teeth involved, biting all around them. He is generally driven to the dentist at last by acute inflammation set up by some inadvertent bite upon the weak member, and he comes with the full expectation that the "loose old thing" must be at once extracted. Too often the dentist, in his haste or inexperience, coincides with the patient and the offending tooth is extracted. While this is sometimes necessary, it is my desire to call attention to the frequent possibility of better service for the patient by a rational, sensible attempt to restore the offending member to comfort and usefulness and hold it in the mouth as long as possible.

It is a well-known fact that one of the most important things to be done for the cure of inflamed conditions surrounding a sore and loosened tooth is the securing for it of absolute rest. If a tooth has had set up in its socket, by traumatism or otherwise, any irritation inducing soreness and the thickening of the investing membrane by encroachment of calculus and congestion of the blood vessels, the

first thing to be accomplished for its relief is to give the tooth absolute rest from contact by occlusion, and to hold it as nearly as possible in a stationary position. This last may be accomplished temporarily by the use of silk ligatures which, properly applied, will secure a considerable firmness in a very loose tooth and permit, in case of undue elongation, the use of the carborundum wheel for freeing the bite, with very little punishment. Next, any lodgment of calculus or other foreign matter about the neck and root of the tooth should be removed as well as the circumstances will permit, and this followed by cleansing and stimulating dressings. In this way relief from the immediate inflammatory condition will be secured. After the intervention of two or three days the inflammation will be found greatly abated and the cleansing and stimulation of the surrounding tissue may be more thoroughly repeated. The ligatures also should be renewed and made as effective as possible. This treatment should be pursued intermittently until the inflammatory conditions are controlled. Then comes the task of making some permanent attachment which shall perfectly fix the tooth and protect it from undue wrenching or exercise in ordinary mastication. The devices indicated are numerous and varied in their structure, and each case will have its peculiarities, requiring some special fixture which may differ from any the operator has ever made, used or seen before. Care should be taken to make them as inconspicuous as possible.

My attention was brought to this subject by the presentation a few days ago of a case which had been treated by me, after the general fashion indicated above, some seven years ago. The two lower centrals had been very much loosened and the process considerably absorbed by the accumulation of a large body of salivary calculus. An ordinary loop fixture including the four incisors was made use of, and the case passed out of my hands. The patient recently returned for further help and informed me that during the seven years nothing had ever been done in the way of removing deposits of calculus or in any way attempting to prevent a recurrence of the original trouble. The result was that the centrals had become entirely imbedded in salivary calculus and were held in the mouth only by the loop fixture and had to be finally sacrificed. If proper attention had been given from time to time, with frequent care and cleansing, there is every probability that the teeth could

have been held for a much longer time in reasonable health and comfort, for seven years with no care indicates a lot of possibilities under favorable conditions, and demonstrates that even with the greatest negligence on the part of the patient, and with a very crude fixture, nature will not only tolerate but condone and help overcome many abnormal things.

One of the most effective as well as simple appliances for retaining the lower incisors in position, where the circumstances are favorable, is the cementing of a stiff, square bar of gold into the biting ends of the four incisors by cutting a groove across their tops. This bar may be made of clasp metal—that is, gold alloyed with platinum —to make it very firm and stiff. The ends may be turned down to form the general effect of a stiff staple, to be let into the teeth forming the abutments. I have cases that have been successfully protected in this way for many years, and one of the best things about such a fixture is that it is practically invisible.—*Summary.*

LITTLE PRACTICAL THINGS THAT COUNT. By Frederick Crosby Brush, D.D.S., New York. Being frequently questioned regarding such details is my apology for offering the following hints. No claim of originality is made, however. Operating tables may be kept in a neat, presentable condition by using blotting paper covers. Such a cover will absorb all moisture from instruments and cotton pellets and prevent the spreading of drops of medicines. They may be readily changed when soiled and are cheap. The bracket table should be provided with a receptacle for waste cotton pellets and dressings instead of allowing them to be strewed around the chair and floor. A good receptacle can be made from a colored glass pomade jar into the top of which a star is cut. The points of the star will engage the cotton and clean the points of the pliers quickly. The jar may be scalded out and kept clean and free from odor. The use of clean operating table covers and cotton receptacles will eliminate a great deal of the disagreeable odor so common to dental offices.

A small piece of pure soap will be found useful in many ways during operations. The mouth mirror may be kept from clouding by coating the glass with dry soap and then wiping clean with a dry napkin. The edge of a sandpaper disk will not catch in the

rubber dam when polishing fillings if it is first run in the soap. Disks and strips will cut faster and polish better if slightly soaped on the grit side before using. Disks and strips thus prepared, that are used for polishing gold fillings, will retain the particles of gold, and if saved and refined will more than pay for the trouble. Rubber dam will slip easily over the teeth if soaped around the holes. Ligature silk when soaped slips easily between the teeth. Use pure soap and sparingly and it will not be disagreeable to the patient.

The excising of a natural crown of a tooth, when a dowel crown is to be used, may be done with a square-end cross-cut enamel fissure bur, gauge No. 1, cutting through the tooth at right angles to its long axis and following closely the gingival border of the gum. By this method little grinding of the root is required and laceration of the gums is avoided.

A Richmond or any banded dowel crown may be removed by slitting the band and drilling between the root and cap with a square drill until the pin is reached and passed a little to one side. The pin may then be cut with a cylindrical cross-cut bur. This will allow the ready removal of the cap and give direct access to the root for the removal of the balance of the pin.

When impressions are to be taken note all conditions of the mouth carefully. If a thick, viscous saliva be present it may be overcome by rinsing the mouth thoroughly with milk of magnesia. The adhesion of the impression material to the teeth may be prevented by coating them slightly with vaselin or by rinsing the mouth with milk of magnesia just before the operation.

When working with wax in the laboratory use a large common school slate for a bench cover; it will catch all pieces and drops of melted wax, and when removed leaves the bench clean and ready for the next work. Wax spots on a bench may be very annoying when gold work is being done.

An excellent tool for trimming around plain teeth in vulcanite work may be made from a broken Gates-Glidden drill by sharpening it to a long thin point. With it the gums may be festooned and all particles of vulcanite be removed from between the teeth.

A small brush wheel with a single row of moderately stiff bristles is excellent for polishing around plain teeth in vulcanite work. If wet soap is applied to the bristles they will retain the wet pumice and cut like a knife. Soap rubbed on a felt buff wheel will retain

the wet pumice, causing it to cut much faster and considerably lessening the time and labor of polishing an artificial denture.

Plaster models of orthodontia cases, etc., may be hardened and given a marblelike surface by boiling them in stearin. The models must be thoroughly dry before putting them into the boiling stearin. Use a double boiler, like a glue-pot, for melting the stearin.

An investment compound that is second to none for crown and bridgework and all soldering purposes is composed of plaster and ashes. The ashes may be prepared for use by sifting common coal ashes until all grit is removed and a soft flaky powder left. The powdered ashes are added to the plaster at the time of mixing, the proportions being about two of plaster to one of ashes. This compound sets up very hard and apparently does not contract or expand, nor does it burn out, warp or crack under the heat of the blowpipe. This compound has proven to be far superior to all mixtures containing marble dust, asbestos, sand, etc., and to many of the specially prepared ones that are on the market.

The light at the operating chair may be very much improved in the late afternoon or on dark, hazy days by using white linen curtains as reflectors. The principal one is an ordinary roller shade fastened at the top of the window casing. The curtain to be the full width of the window and of sufficient length to allow of its being drawn out over the operating chair, above the operator's head, and attached to some fixed point in the wall or screen. The spring in the curtain fixture, if left uncaught, will be sufficient to keep the curtain taut. This curtain with its glazed white surface, sloping downward or backward from the top of the window opening, will direct the rays of light onto the operating field instead of permitting them to be dispersed into the room. The system of curtains may be carried much further to good advantage. Broad white curtains may be attached to brackets swinging at right angles to the window frame and adjusted at an angle that will direct the light rays as desired. By this means the operating chair may be easily and quickly inclosed in a box having white reflecting sides. The dead white of the curtains seem to soften the intensity of the light so that it is not unpleasant for the patient and causes no particular eye strain on the operator. The use of curtain reflectors has enabled me many times to continue operations without the aid of an artificial light, which is such a strain on the eyes of both operator and patient.—*Brief.*

The Dental Digest.

PUBLISHED THE LAST WEEK OF EVERY MONTH

At 2231 Prairie Avenue, Chicago,

Where All Communications Should be Addressed.

Editorial.

ORGANIZATION AND COOPERATION IN DENTAL SOCIETY WORK.

Our readers will remember that on several occasions in the past we have criticised the apathy which obtains in the work of almost all dental societies, and have urged as one cause of the poor attendance at meetings and the small membership of organizations the fact that the work has fallen into a rut, that the officers simply follow in the narrow footsteps of their predecessors, and that the meetings and society are anything but well advertised. The officers of the Northern Indiana Dental Society thought they would try the plan of greater publicity, so they put announcements in nearly every issue of the dental journals, beginning ten months before the meeting, sent a program, a postal and a personal letter to each one of 500 dentists, and the secretary in some cases wrote as many as five letters to a single dentist to induce him to attend. Contrary to custom, several meetings of the officers and executive committee were held prior to the meeting, and in this way the cooperation and enthusiasm of each one was secured, so that several of the officers also wrote personal invitations to their friends. The result was that at the meeting held in Huntington last October, despite the fact that the society had to contend with a world's fair, a dental congress and a political campaign, over two hundred men, double the number of any previous year, were in attendance, ten excellent essays were read, forty men gave clinics, and over forty exhibitors helped to increase the interest of the meeting. This is an excellent record for a small local society, which drew simply from the dentists in neighboring territory.

The best example of what can be accomplished when officers set

themselves to the work is the monster meeting of the Chicago Odontographic Society two years ago, when over two thousand seven hundred dentists were in attendance. We described in detail at the time the methods by which such a result was accomplished, so will not repeat, but an example was set which has not since been equaled, and which will probably remain for a long period as the one striking illustration of what can be done by organization and cooperation.

If so much can be accomplished by a few men who are working to make only one meeting a success, how much more could be done in the greater work of perfecting the organization and increasing the membership of existing dental societies. Inasmuch as this issue of the DIGEST goes to every dentist in Chicago and Illinois, we would call attention to the work which is now being done by the Illinois State Dental Society. Full details of same will be found in the article by Arthur D. Black on page 1450 of this issue. Small wonder that the state dental societies have no influence with the law-makers or public, when it is realized that at the present time there is hardly a state which has ten per cent of the dentists within its borders as members of the state society, and some have a much smaller number. It is expected that before the annual meeting in Moline next May the secretary of the Illinois State Dental Society will have received the dues of over one thousand members, and the probabilities are that at least one thousand five hundred, or about half the dentists of the state, will be enrolled before the present campaign of reorganization is completed. When we note the fact that the actual paid membership of the society has never before exceeded three hundred, and consider the increase that has been brought about in so short a time, it becomes through its possible effects a matter of more than local interest. If Illinois is able to enroll from one-third to one-half of the dentists of the state as members of the state society, there is no good reason why other states cannot do the same, and if they should we would have within a few years a total membership of about fifteen thousand in the state societies. Then suppose those organizations should affiliate—it is almost impossible to conceive the influence that could be exerted by a National Dental Association of fifteen thousand members, half the profession or over. Illinois is setting the example—will other states follow it?

Notices.

LOGAN COUNTY (ILL.) DENTAL SOCIETY.

The Logan County (Ill.) Dental Society was organized at Lincoln, Dec. 19, 1904, and the following officers were elected: President, R. M. Lawrance; Vice-president, R. Goebel; Secretary and Treasurer, S. G. Hobbit.

ISAAC KNAPP DENTAL COTERIE.

The annual meeting and banquet of the Isaac Knapp Dental Coterie were held at Fort Wayne, Ind., Dec. 8, 1904, and the following officers were elected: President, J. S. McCurdy; Secretary, M. A. Mason; Treasurer, J. D. Coyle.

XI PSI PHI, BETA CHAPTER.

The XI Psi Phi (Beta Chapter) have organized an alumni association and will hold a dinner in New York City during the latter part of February. For further information, address

HORACE W. KING, 85 Main St., Flushing, N. Y.

NEW HAVEN DENTAL ASSOCIATION.

The New Haven (Conn.) Dental Association held its annual meeting Dec. 16, 1904, and elected the following officers: President, F. W. Brown; Vice-president, E. S. Gaylord; Treasurer, Henry A. Spang; Secretary, E. F Cory.

SILVER BOW DENTAL ASSOCIATION.

The annual meeting of the Silver Bow Dental Association was held at Butte, Mont., Nov. 21, 1904, and the following officers were elected for the ensuing year: President, S. Keyser; Vice-president, J. W. Sandberg; Treasurer, F. H. Bimrose; Secretary, A. D. Galbraith.

INDIANA STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Indiana State Board of Dental Examiners will be held at the State House in Indianapolis, Jan. 10, 1905, for the examination of all applicants for registration. For further information address

F. R. HENSHAW, Secy and Treas., Middletown, Ind.

MADISON COUNTY (ILL.) DISTRICT DENTAL SOCIETY.

The Madison County District Dental Society, embracing the counties of Madison, Jersey, Macoupin, Calhoun and Greene, was organized at Alton, Dec. 7, 1904, and the following officers were elected: President, C. B. Rohland, Alton; Vice-president, C. C. Corbett, Edwardsville; Secretary and Treasurer, E. L. Burroughs, Edwardsville.

SYRACUSE (N. Y.) DENTAL SOCIETY.

The Syracuse (N. Y.) Dental Society held its annual meeting Dec. 7, 1904, and elected the following officers: President, C. M. Ryan; Vice-president, C. H. Dower; Corresponding Secretary, C. G. Schamu; Recording Secretary, C. G. Peters; Program Committee, G. H. Butler and A. R. Cooke.

QUONEHTACUT DENTAL CLUB.

The annual meeting and banquet of the Quonehtacut Dental Club were held at Hartford, Conn., Dec. 10, 1904, and the following officers were elected: President,, G. O. McLean, Hartford; Vice-president, R. W. Brown, New London; Secretary and Treasurer, Chas. McManus, Hartford.

EASTERN ILLINOIS DENTAL ASSOCIATION.

The Eastern Illinois Dental Association was organized at Newman, Dec. 7, 1904, and the following officers were elected: President, J. W. Ritter, Charleston; Vice-president, F. D. Parker, Paris; Secretary, C. G. Bacon, Newman; Treasurer, S. A. Campbell, Mattoon; Librarian, E. D. Cretors, Paris.

LYCOMING COUNTY (PA.) DENTAL SOCIETY.

The Lycoming County (Pa.) Dental Society held its annual meeting at Williamsport, Dec. 19, 1904, and elected the following officers: President, A. V. Robbins; Vice-president, J. W. Harrer; Secretary, S. H. Sprout; Treasurer, C. R. Jordan; Executive Committee, Drs. Walker, Skillman and Hubbard.

CORRECTION BY DR. J. P. BUCKLEY.

Dr. Buckley asks us to print the following as a correction of an extract which appeared on page 1414 of the November DIGEST—"When arsenic has been used for the purpose of devitalizing the pulp tissue, tannic acid should *not* be sealed within the tooth, and every trace of the dialized iron (if used at all) and blood should be removed with alcohol. To those familiar with my practice and teaching the extract as it appeared would show a change of position on my part."

WISCONSIN STATE BOARD OF DENTAL EXAMINERS.

The next meeting of the Wisconsin State Board of Dental Examiners for examination of candidates for license to practice dentistry in Wisconsin will be held in Milwaukee, January 30, 1905. Application must be made to the secretary fifteen days before examination. The candidate must be a graduate of a reputable dental college, or have been engaged in the reputable practice of dentistry consecutively for four years, or an apprentice to a dentist engaged in the reputable practice of dentistry for five years. For further particulars apply to J. J. Wright, Sec'y, 1218 Wells Bldg., Milwaukee.

FRATERNAL DENTAL SOCIETY OF ST. LOUIS.

The annual meeting of the Fraternal Dental Society of St. Louis was held Dec. 20, 1904, and the following officers were elected: President, B. L. Thorpe; Vice-president, E. P. Dameron; Secretary, S. H. Voyles; Treasurer, W. E. Brown; Executive Committee, E. E. Haverstick, W. L. Whipple, T. G. Donnell.

S. H. VOYLES, Secy.

ST. LOUIS DENTAL SOCIETY.

The St. Louis Dental Society held its annual meeting Dec. 6, 1904, and elected the following officers: President, C. D. Lukens; 1st vice-president, H. Hill; 2d Vice-president, J. F. Austin; Recording Secretary, B. E. Lischer; Corresponding Secretary, B. Pippin; Treasurer, W. A. Roddy; Librarian, C. C. Cowdery.

JOINT MEETING SOUTHERN BRANCH NATIONAL DENTAL ASSOCIATION AND TENNESSEE DENTAL ASSOCIATION.

The eighth annual meeting of the Southern Branch of the National Dental Association will be held in conjunction with that of the Tennessee Dental Association, at Memphis, Feb. 21-23, 1905. Special railroad rates, one and one-third, certificate plan.

J. A. GORMAN, Cor. Secy., Asheville, N. C.

NATIONAL CAPITOL DENTAL SOCIETY.

The first annual meeting of the National Capitol Dental Society was held at Washington, D. C., Dec. 3, 1904, and the following officers were reelected: President, James A. Hunter: Vice-president, W. B. Daly; Treasurer, J. B. Shafhirt; Recording Secretary, S. Parsons; Corresponding Secretary, J. K. Halley; Librarian, C. Beatty.

WINNEBAGO COUNTY (ILL.) DENTAL SOCIETY.

The Winnebago County (Ill.) Dental Society, embracing the counties of Winnebago, Boone, Ogle and McHenry, was organized at Rockford Dec. 8, 1904, and the following officers were elected: President, A. M. Harrison, Rockford; Vice-president, F. A. Weld, Belvidere; Secretary, A. B. Culhane, Rockford; Treasurer, C. J. Sowle, Rockford.

LINCOLN (NEB.) ODONTOGRAPHIC SOCIETY.

The annual meeting of the Lincoln Odontographic Society was held Dec. 12, 1904, and the following officers were elected: President, H. F. Helms; Vice-president, M. E. Vance; Secretary and Treasurer, F. B. Damron. The first annual mid-winter clinic will be held Jan. 16-17, 1905, and all ethical practitioners are cordially invited to be present.

F. B. DAMRON, Secy.

OHIO STATE DENTAL SOCIETY.

At the thirty-ninth annual meeting of the Ohio State Dental Society, held in Columbus, Dec. 6-8, 1904, the following officers were elected: President, S. D. Ruggles, Portsmouth; 1st Vice-president, H. L. Ambler, Cleveland; 2d Vice-president, H. C. Brown, Columbus; Secretary, F. R. Chapman, Columbus; Treasurer, C. I. Keely, Hamilton. F. R. CHAPMAN, Secy.

LOS ANGELES ASSOCIATION OF DENTAL ALUMNI.

The annual meeting of the Los Angeles Association of Dental Alumni was held Dec. 6, 1904, and the following officers were elected: President, G. M. Crow; Vice-president, J. F. Kern; Secretary and Treasurer, R. B. Robinson; Member Board of Directors, J. W. Gray. Our meetings are held the first Tuesday of every month and visiting dentists are heartily welcome.

WILLIAM BEBB, Cor. Secy.

CHAMPAIGN COUNTY (ILL.) DISTRICT DENTAL SOCIETY.

Dec. 1, 1904, the dentists of Champaign, Piatt, Ford and Iroquois Counties met at Champaign and organized the Champaign County District Dental Society. The following officers were elected: President, H. E. Davis, St. Jo; Vice-president, F. O. Sale, Urbana; Secretary, J. A. Brown, Champaign; Treasurer, C. C. Van Scoyoc, Champaign; Librarian, F. M. Conkey, Homer.

News Summary.

I. S. BRYANT, 66 years old, a dentist at La Junta, Col., died Dec. 26, 1904.

W. A. DROWNE, 51 years old, a dentist at El Paso, Tex., died Nov. 28, 1904.

E. G. CUMMINGS, 76 years old, a dentist at Concord, N. H., died Dec. 13, 1904.

T. PHILLIPS, 28 years old, a dentist at Scranton, Pa., died suddenly Dec. 19, 1904.

WILLIAM A. ROSS, 87 years old, a dentist at Kansas City, Kan., died Dec. 31, 1904.

E. H. BROCK, 56 years old, a dentist of Lynn, Mass., died Dec. 5, 1904, of paralysis.

W. R. JOHNSON, a dentist of Montague, Mich., died Dec. 14, 1904, of pneumonia.

A. H. KING, 72 years old, a dentist of Baltimore, died Dec. 19, 1904, of heart failure.

S. T. PAINE, 40 years old, a dentist at Batavia, N. Y., died Dec. 11, 1904, of heart disease.

R. A. KEMPTER, 40 years old, a dentist at Marshfield, Wis., died of paralysis Dec. 24, 1904.

L. S. WOLFE, 45 years old, a retired dentist at Orangeburg, S. C., died Dec. 25, 1904.

M. D. THURSTON, 47 years old, a dentist at Spokane, Wash., died Nov. 17, 1904, of appendicitis.

J. C. HARDIN, 73 years old, a retired dentist at Easton, Md., died suddenly of heart failure Dec. 17.

A. H. WEAVER, 30 years old, a dentist at Staunton, Va., died Nov. 30, 1904, from an accidental overdose of chloral.

D. L. STINE, 36 years old, a dentist of Indianapolis, died Dec. 7, 1904, following an operation for appendicitis.

R. J. STEVENS, formerly in practice of dentistry at Caledonia, N. Y., died of consumption Nov. 29, 1904, at Canon City, Col.

COCAIN CAUSES DEATH.—December 2, a woman at Winchester, O., died from the effects of cocain applied before tooth extraction.

FLOYD CARTER, 40 years old, a dentist at Gate City, Va., accidentally killed his child in a fit of anger, and then killed himself through remorse.

DENTIST CUT WITH RAZOR.—Cliff Duncan, a dentist at Columbus, Ga., had his throat cut with a razor by his uncle during a quarrel Nov. 29, but is expected to recover.

DENTIST CONVICTED OF BRIBERY.—J. B. Vernon, a dentist of St. Louis, was convicted of having bribed a federal official, and on Dec. 9 was sentenced to three years in the penitentiary.

Young Nivins: "Hullo, Joe! Been having a tooth extracted?"

Exasperated Sufferer: "No, I ain't been having it extricated, neither; I just set down and had it pulled out."—*Brit. Dent. Jour.*

SEPARATING MEDIUM.—A good separating medium is made by dissolving paraffin in gasoline.—Put in all that the gasoline will take up. To use, spread solution over impression lightly with a camels hair brush.—G. T. RICHARDS, *Hints.*

RELIEF OF NAUSEA AFTER ANESTHETICS.—I have found good results follow the use of drop doses of nux vomica every ten minutes. However, if blood is present in the stomach we must use means to get rid of it.—C. N. ABBOTT, *Dominion.*

RESTORING FACING.—There is often a difficulty in finding the right spots to drill through the backing when a broken facing is to be replaced upon a bridge. Flow a little wax upon the backing, place facing in proper place, press pins through the wax and then drill with proper bur.—E. P. BEADLES, *Hints.*

ORTHOFORM COTTON.—Saturate cotton with a saturated solution of orthoform. Dry and keep in convenient bottle. Very useful for packing the alveoli after extraction, to prevent pain; also other wounds liable to be painful, such as pyorrhea pockets, exposed pulps, lacerated gums after extraction of impacted third molars, etc. It stops pain and hemorrhage and leaves no bad aftereffects.—*Register.*

SOLDERING.—In soldering often the solder will not flow just where you wish it to go. Take an inch or two of the carbon from a pencil and fasten with binding wire to an old excavator and use to direct the solder when in a molten state.—E. P. BEADLES, *Hints.*

PUTRESCENT PULPS.—For putrescent pulps which are still sensitive upon touch of broach, a mixture of tannic acid with glycerin will in a few days so toughen and tan the pulp that it may be removed entire and with little or no pain.—A. F. STRANGE, *American.*

LESSENING THE DISCOMFORT OF THE PATIENT.—In filling a large sensitive cavity with amalgam, warm the plugger or burnisher each time you use either. In finishing a gold filling run the bur before use into a bit of beeswax and coat the disk with vaselin.—DR. F. M. SMITH, *International.*

ADHERENCE OF PORCELAIN INLAYS.—Hydrofluoric acid will remove the glaze and leave a roughened surface that cement will adhere to. Do not try to neutralize the acid, but remove mechanically with water and a stiff brush the fine powder resulting from the action of the acid.—W. T. REEVES, *Summary.*

NO MONOCLE FOR THE MOGUL.—"What are you studying now?" asked Mrs. Cumrox. "We have taken up the subject of molecules," answered her son. "I hope you will be very attentive and practice constantly. I have tried to get your father to wear one, but he couldn't make it stay in his eye."—*Washington Star.*

EXACT.—"Open your mouth a little wider, please," said the dentist.

"My friend," replied the professor, "I can't open my mouth any wider. But I can extend it vertically a little more, if you insist upon it." For nothing jars the professor's nerves worse than the use of slipshod English.—*Brit. Dent. Jour.*

PHASES OF THE TOOTH-STATE.—It is not news to read that "some people are born with teeth, some achieve teeth, while others have teeth thrust upon them;" but the phases of tooth-change were never more neatly stated than recently by a patient as "first calcareous, then precarious, and finally vicarious."—*D. O. and L.*

ROOT-CANAL FILLING.—Free and easy access to the canals must be made, however much tissue has to be sacrificed. I am very careful to avoid perforation of the apex. I have found oxychlorid of zinc by far the best material for filling root-canals, as it remains sweet and pure indefinitely. I have also found charcoal an exceedingly valuable filling, and as it is practically insoluble it ought to prove a permanent one.—T. WILSON HAGUE, *International.*

CAPPING LIVE TEETH.—If live teeth, which are to be capped, either for single crowns or bridges, are first dried and then coated with a chloroform solution of gutta-percha and dried again by means of the chip-blower before placing the cement-filled shells in position, a bar to thermal changes is afforded and also protection against the chemical action of the phosphoric acid. This meets the requirements of the case as perfectly as anything else within our reach.—W. A. BOSTWICK, *Dent. Off. and Lab.*

PARTIAL IMPRESSIONS IN PLASTER.—Vaselining the teeth, especially for a second impression at the same sitting, gives a sharper impression and greatly facilitates the removal of the plaster. Apply the smallest quantity of vaselin in the meshes of a bit of cotton; this fully realizes all reasonable expectations.—*Dent. Off. and Lab.*

HYGIENE OF THE MOUTH.—Make it a special point that the gingival tissues covering the roots of the teeth to the entire limits of the alveolar processes, both internally and externally, rather than the teeth, must receive brush-friction. If this portion of the mouth is brushed the teeth themselves will receive their ample share.—J. W. WASSALL, *Review.*

HYPERTROPHIED GUM TISSUE.—Trichloracetic acid applied to hypertrophied gum tissue overlying the cervical border of deep-seated cavities accomplishes three things—checks the bleeding, shrinks the tissues, and by producing a white eschar lights up the cavity to an appreciable extent. In such cases I consider it superior to adrenalin.—G. B. SQUIRES, *Items.*

TO REMOVE BROKEN DRILL FROM ROOT-CANAL.—Saturate a pledget of cotton with twenty-five per cent pyrozone and seal in canal with gutta-percha for at least three or four days, when the drill will be found completely rusted and loosened so that a forcible injection of water from a bulb syringe will readily effect its dislodgement.—S. J. FERNANDEZ, *Cosmos.*

TOOTH POLISHER.—Tecum fibre is a most efficient article for polishing the proximal surface of the teeth, being fine, strong and charged by nature with grit—silex, like the cortex of a reed. It can be drawn between the most closely set teeth with the aid of a little vaselin in exetreme cases; this does not seem to impair its efficiency.—DR. BROCKAWAY, *International.*

DIVORCES.—James T. McBride, a dentist of Columbus, O., whose wife recently secured a divorce from him, has brought suit to have the decree set aside, alleging fraud in the testimony.—C. A. Morsman, a dentist of Joplin, Mo., has been sued for divorce by his wife.—T. Seifried, Jr., a dentist at Nashville, Tenn., has brought suit for divorce against his wife.

FIGURES.—There was a young lady of Skye,
With a shape like a capital "I!"
She said, "It's too bad!
But then I can pad"—
Which shows you that figures can lie.—*Ex.*

ILLEGAL PRACTITIONERS.—Oct. 15, a warrant was sworn out for a dentist at Tucson, Ariz., who had been practising without a license, but he skipped town.—Nov. 4, a man at San Jose, Cal., was arrested for practising dentistry without a license.—Nov. 3, a dentist in Denver was arrested for practising dentistry without a license.—Oct. 22, a man was fined $10 and costs at Anite City, La., for practising dentistry illegally.—Oct. 19, the proprietor of a dental parlor in Salt Lake City, Utah, was arrested for practising dentistry without a license after he had failed to pass the board examination.—Nov. 4, a man at Puyallup, Wash., was arrested for practising dentistry without having secured a state license.

PUTRESCENT ROOT-CANALS.—The dentinal tubules of an infected tooth are saturated with putrescent protoplasm, which no instrumentation can reach; the only way of thoroughly sterilizing the tubules and rendering the root absolutely safe to fill is to so act on the contents that nothing is left. The agent used is sodium dioxid; it not merely destroys the life of bacteria and renders pus and débris more or less aseptic, but it simply removes everything in the canal, whether proteid or fatty.—BERNARD BENNETTE, *Record.*

ANATOMICAL.—This man knew his anatomy:

"Who is at the telephone?"

"Your wife, sir."

"What does she want?"

"The only word I can understand is 'numskull.'"

"Let me come there. She probably wants to talk with me."

—*Topeka State Journal.*

JUMPING THE BITE.—An inclined plane for jumping the bite and fixing the occlusion, which is automatic in its action, requiring no attention from patient or operator, and which is both cleanly and effective, is made of a fairly heavy piece of platinized gold plate soldered to bands of seamless tubing encircling the upper central incisors and firmly cemented on, with a round lug wire resting on the ends of the laterals, the gold being dressed away from the palatal side of the laterals as much as possible.—GEO. C. AINSWORTH, *International.*

IMPORTANCE OF MASTICATION.—Thorough chewing not only puts the food in condition for the action of the gastric juice, but it develops the jaws, stimulates the circulation of the blood and lymphatics in the mouth and contiguous parts, causes an increased flow of alkaline juices prolonging the action of the ptyalin within the stomach, and by massaging the teeth and gums prevents decay of the teeth and promotes healthy growth and development. Prolonged mastication also greatly increases the nutritive power of the food.—DR. HARRY CAMPBELL, *Lancet.*

EXAMINING BOARD AFFAIRS.—At the December meeting of the Arkansas Board 9 out of 12 applicants were successful in passing the examination.—At the December meeting of the Idaho Board 5 out of 7 applicants were granted licenses.—At the last meeting of the Massachusetts Board 33 out of 65 applicants successfully passed the examination.—The Rhode Island Board was recently sued by two students who had failed to pass the examination and who petitioned for a writ of mandamus to compel the board to issue them certificates. The court sustained the board.

BRIDGING SPACES IN SOLDERING.—(1) Rub up in a mortar equal quantity of filings of an easy-flowing solder and filings of the gold to be soldered, with borax and water, making a thick paste, with which pack the joint to be soldered. The particles of high-fusing metal serve as a support to retain the shape of the mass, the low-fusing solder acting as a cement to unite the particles and bind them to the pieces being soldered.—F. W. SUTPHIN, *Summary.*—(2) In addition to the filings, use gold foil in strips, rope or pellets, packed to place with a thin plugger.—*Dent. Off. and Lab.*

COMMENDABLE PRIDE.—One of our subscribers writes that he recently received the following request from one of his women patients: "Dentist Hughes, Will you send me a temporary plate of four front teeth to wear until my gums shrinks so you can make my teeth. I would be awful proud, as it is Xmas times and I don't like for anyone to see me without any teeth."

TOOTHPASTE AND PUMICE STONE.—The addition of a small portion of Euthymol toothpaste to pumice stone for cleansing the teeth at the chair offers a valuable adjunct to treatment. It imparts an agreeable flavor, is cooling and stimulating to the mucous membrane, prevents the pumice stone from being thrown about, and is gratefully received by the patient.—G. A. Miller, Chicago.

FIRES.—P. H. Brown and P. W. Pryor, Stamford, Conn., Dec. 14, loss $3,000, partly insured.—J. W. Galloway, Estherville, Ia., Dec. 27, loss $1,200, insurance $400.—F. Dietch, St. Joseph, Mich., Dec. 9, loss $500.—P. H. Eisloeffel, St. Louis, Dec. 13, loss $200.—W. N. Beekman, Brooklyn, Nov. 22, loss $200.—F. I. Sumner, Norwich, N. Y., Dec. 12, loss $200.—I. J. Cramp, Rochester, N. Y., Dec. 2, loss $5,000, insurance $3,000.—E. F. Babcock, Perrysburg, O., Dec. 6, loss $300, insurance $100.—Hartpence Dental Supply Co., Columbus, O., Dec. 21, loss $8,000, fully insured.—J. W. Davis, Newark, O., Dec. 29, loss $300.

SOFT WATER A CAUSE OF CARIOUS TEETH.—In some portions of Lancashire, England, there are towns in which edentulous mouths are the rule. An excursion party was inspected in Blackpool and an average of three teeth was found in the company—made up of men, women, lads and lasses. I was told that in the district from which these people came the drinking water was devoid of mineral or calcic elements, and the teeth simply crumbled away in childhood. In Glasgow, which is supplied with soft water from Loch Katrine, the people's teeth are notoriously bad, while in Birmingham, where the water is hard, the teeth are of better structure and more durable.—*Exchange.*

ACCIDENTS.—John Corwin, a dentist of Chicago, was severely burned with sulphuric acid Dec. 29, while making a disinfecting solution.—Last month a woman at Fowlerton, Ind., almost died from the effects of having her jaw broken by a dentist who was extracting some teeth.—Last month a woman fainted on the street in Kansas City from the effect of an application of cocain given prior to the extraction of a tooth.—According to newspaper report, a woman at Galesburg, Mich., is suffering from a lacerated mouth and tongue due to the explosion of her false teeth. The report states that she heated her face to relieve neuralgia and then suddenly placed a piece of ice in her mouth. It makes interesting reading anyhow.—Richard Wolff, a dentist of New York City, was thrown from his horse Nov. 27 and sustained a fractured skull.—The newspapers tell us that last month a farmer at Hanover, Pa., picked a hot chestnut from the stove and placed it in his mouth, with the result that it exploded and blew out several teeth and split his lip.—Last month a man at Wynnewood, Pa., took gas and had several teeth pulled. Some hours later he became violent and had to be restrained.

OPENING INTO A PUTRESCENT TOOTH.—I fear to go into a putrescent tooth with any instrument without first making the tooth cavity and instrument as sterile as I can with medication, without attempting any mechanical work other than to enter the pulp-chamber. I apply the rubber dam, dry the cavity, and cover the pulp-chamber with forty per cent formalin on a bit of cotton; seal as hermetically as I can with the best cement and leave it for twenty-four hours. Even though the tooth is sore to the touch, such a treatment will take care of it, and in eighty per cent of my cases will give a pulp-chamber free from odor, and I feel almost sure there is freedom from bacilli.—DR. FERRIS, *Items.*

DAMAGE SUITS.—A jury in Grand Rapids, Mich., has awarded a dentist the amount of his claim, $100, against a woman who ordered a gold plate and then refused to pay for it because she claimed it did not fit.—A woman in Joplin, Mo., has sued a dentist, claiming that she paid him $30 in advance for some dental work, and that for three weeks he has kept putting her off from day to day.—A woman in Brooklyn has brought suit against the proprietor of a painless dental parlor for injuries to her son caused by malpractice.—A woman in Brooklyn has sued a dentist for $500 damages, alleging that he pulled a sound tooth instead of the decayed and aching one which she indicated.—A man in Nashville, Tenn., brought suit for $500 damages against a dental parlor in that city, alleging that one of the operators pulled the wrong tooth. The jury has given him $250.

TO PREVENT SORENESS OF THE LIPS AFTER OPERATING.—White perfumed vaselin will be found a most excellent preventative of sore lips from long and repeated applications of the rubber dam. Although many ladies object to its use on account of the general impression that it stimulates the growth of hair, I find upon explaining the good results from its use, the avoidance of the so-called cold sore, etc., they will gladly submit to its application. Two covered porcelain jars with the pure white vaselin are kept in the operating case, the contents of one for use as an application around the mouth, the contents of the other for strips and disks. By cleaning the jars every day, and placing in them a small quantity of the clean vaselin, they are ready for use, and if need be for the inspection of the most particular patient. It is the exception when the most fastidious lady, when handed the jar and the explanation is made for its use, will not apply it immediately, and later bless you for having suggested it. Undoubtedly the saliva saturating the skin and being held there by the rubber plays an important part in addition to our pulling and stretching the mouth, in producing these disagreeable sores. In long operations, especially in molars and bicuspids, a second and third application sometimes are indicated, which can be made by loosening the dam from the holder, drying the corner of the mouth thoroughly with a napkin, and applying the vaselin. If applied to the lips when they are dry or cracked, it softens them to such an extent that much of the discomfort of an operation is avoided.—W. T. CHAMBERS, Denver, *International.*

ARTICULATED MODELS AS EDUCATORS.—To logically acquaint a patient with the true state of his teeth, something more than the expression of opinion or the quotation of the dental authorities on the subjects involved is required, and nothing is so good for the purpose as articulated models of the patient's teeth. It is the work of but a few minutes to take a modeling-compound impression—absolute accuracy is not required—and to run plaster models. While these are setting a filling may be inserted, calculus removed, or any initial operation demanded by the case may be performed. Before the patient leaves the office—or if the first sitting has been for examination only, before the next sitting commences—he may be shown the articulated models of his teeth, and nothing else will so convince him of their true condition and the necessity for intelligent service.—FRANK L. PLATT, *Pacific Dent. Gaz.*

PLATE IN STOMACH FOUR YEARS.—Dr. Elmer, in the *New York Medical Journal*, reports an unusual case. June, 1899, a farmer in New Jersey fainted while planting corn and swallowed an upper plate with three front teeth attached. It lodged in the esophagus and remained there about six months, during which time the patient could take only liquid food and was subject to more or less pain. Then the plate evidently went further down, as he was able to swallow solid food, but was subject to frequent attacks of indigestion and considerable pain. Three and one-half years from the day he fainted the pain and distress left his stomach and his appetite and digestion began to improve, but he had to be treated at different times for pain in the intestines. Four years after swallowing the plate he passed it during a free movement of his bowels. There are cases on record where foreign bodies have remained in the system a longer time than this, but they have always been removed by operation, and have caused serious disturbance and frequently death.

PRACTICABILITY OF CERTAIN PHASES OF "EXTENSION FOR PREVENTION."—The extension of every approximal cavity cervically to beneath the free margin of the gum, and in bicuspids and molars well across the occlusal surface of the teeth, with well-prepared seats and steps and angles for the retention of the filling, may be correct in theory, but in practice is not universally necessary, as is proved by the prolonged usefulness of many fillings in cavities not so extended. Extension for prevention is certainly provocative of a horror of the dental chair that is not complimentary to the profession or its practitioners. The correct use of tin foil, amalgam, and gutta-percha, and the application of lining materials to frail or sensitive cavity walls—in short, the selection and practical utilization of proper filling materials—will save teeth without needless torture and an unnecessary expenditure of time and endurance on the part of both patient and operator. There is a middle course which may be followed in dental operations which will prevent both slovenly, unfinished work on the one hand, and needless infliction of pain on the other. In the treatment of young patients, children experiencing their first introduction to dentistry, this course is most certainly the best, and need not be made to overtax the endurance and courage of anyone.—*Gazette.*

LUPUS AND THE LIGHT CURE.—It has been a popular belief that lupus is a very rare disease, common only in the northern countries, and although it has been supposed that there was no lupus in London, yet the hospitals are now treating 175 cases daily, and the management of the London Hospital has been compelled to install two more lamps and build a separate department, so great has been the demand from people seeking relief. Lupus was considered very rare in the United States, but since the establishment of the Finsen Light Institute in Chicago, the author is informed, those in charge have been taxed to their utmost capacity and have found it necessary to increase their facilities, as there are now patients on the waiting list who are not able to receive treatment. It seems but a question of a short time until light institutes will be established in every large city in America, from the fact that the treatment has proved efficacious in many other skin diseases besides lupus and rodent ulcer—in such as acne, alopecia areata, localized eczema, chronic ulcers, and nevus.—H. J. STEWART, *Pacific Dent. Gaz.*

A. D. 2000.

Give me a spoon of oleo, ma,
  And the sodium alkali,
For I'm going to make a pie, mamma,
  I'm going to make a pie.
For John will be hungry and tired, ma,
  And his tissues will decompose;
So give me a gram of phosphate,
  And the carbon and cellulose.
Now give me a chunk of casein, ma,
  To shorten the thermic fat,
And give me the oxygen bottle, ma,
  And look at the thermostat.
And if the electric oven is cold,
  Just turn it on half an ohm,
For I want to have the supper ready
  As soon as John comes home.—*Pop. Mech.*

ILLEGAL PRACTITIONERS.—Dec. 1, a dentist at Denver was arrested for and found guilty of practising dentistry without a license.—Nov. 28, the proprietors of a dental parlor at Danville, Ill., were arrested for practising without a license, but at the trial one of them produced an M. D. certificate, and the court decided that same gave him the right to practise dentistry.—Two rival dentists in Brooklyn have been setting up stands on street corners and extracting teeth free of charge, so the board of aldermen has passed an ordinance "restraining the practice of dentistry in the streets of the Borough of Brooklyn."—Dec. 29, a dentist at Mansfield, O., was arrested for practising dentistry without a license. The specific charge was filling a tooth for a man for the sum of 75 cents. He ought to be given the extreme penalty of the law for charging such a fee.—Dec. 21, a dentist at Newark, O., proprietor of a painless dental parlor, was arrested for practising without a license, and when the case came to trial he failed to appear and his bond was

forfeited.—Nov. 26, a fakir was arrested at Houston, Tex., for extracting teeth without a license. He did the work free of charge to advertise a patent medicine which he was selling.

ROBBERIES.—J. G. Ferrell, Chicago, Dec. 17, $75, by footpads.—Dr. C. N. Johnson of Chicago was held up Dec. 22 and robbed of over $200 worth of valuables.—C. E. Whitesides, Marion, Ill., Nov. 27, $100.—Martin & Woodward, Alexandria, Ind., Nov. 16, $60.—C. Steinmetz, Kansas City, Kan., Nov. 27, $75.—D. P. Wetzel, Wellington, Kan., Dec. 19, $150.—F. C. Kenney, Louisville, Ky., Nov. 25, $35. The thief was arrested.—V. E. Koch, Joplin, Mo., Nov. 9, $65.—Dec. 1, the offices of thirteen dentists in one of the big office buildings in New York City were robbed of a total of $1,500 worth of gold.—The police of Brooklyn think they have in custody the young man who has robbed fourteen dentists in that city during the past month. His plan of procedure was to call on a dentist and ask to be allowed to remain in the waiting room until his father arrived to have some work done. At the first favorable opportunity he would hide somewhere around the office or house, and when the coast was clear he would take all the valuables in sight and depart.—A man has been convicted in Columbus, O., of burglarizing a dental office.—Justin Boyce, Providence, R. I., Dec. 1, $20.—F. G. Wishard, Chattanooga, Tenn., Nov. 23, $30.—Nov. 19, thieves robbed all the show cases in front of dental parlors on one of the business streets in Spokane.

TO DETERMINE THE "SUFFICIENT DOSE."—Contet (*Gazette des Hopitaux*) endeavors to show that better results would be obtained with remedies if physicians could employ some clinical sign or signs which would be evidence of the sufficient physiological activity of the substance given in any case. Patients and diseases vary so much that it is impossible to state "the sufficient dose," and this usually has to be determined empirically, often to the detriment of the patient. He employs a method, suggested by Gilles de la Tourette, who utilized it in the treatment of epilepsy. Among other symptoms produced by the bromids he fixed upon the disappearance of the pupillary light-reaction as the clinical sign to be used as a guide. He commenced with very small doses and increased until this sign of intolerance appeared. This was considered the evidence of saturation, and the therapeutic dose was governed accordingly. Dr. Contet applies this principle in giving other drugs. In mercury, for instance, the clinical sign is the fever of mercurialization; the administration of this substance for its systemic effect should be carried on with the thermometer as a guide; when fever follows its use the quantity should be reduced just below that which produces this symptom. Nitroglycerin is another example; the clinical sign of sufficient vasodilatation is the production of slight headache. It would be interesting and useful, Dr. Contet says, for the physician to know a clinical sign of easy observation for every medicinal substance, analogous to those just quoted, in order to be able to judge, other than by therapeutic results, of the activity of the agent employed. In the same way the author advocates the giving of fractional doses until desired results are obtained. Thus, in giving chloral or opium the physician is often at a loss as to the size of the dose necessary to produce

the desired result. Rather than give a single dose of uncertain effect, is it not better to divide the dose, giving every hour, half-hour, or even quarter-hour, until the desired sign of action appears, as relief of pain from opium or sleepiness from chloral—avoiding of course the danger-point in dosage?

WIRE LIGATURES.—From time to time in our literature it has been recommended to use the wire ligature instead of silk in connection with the application of the rubber dam, but this recommendation has not met with a wide adoption. The reason probably is that no suitable wire has ever been found. Recently an attempt was made to use such a ligature, making use of the ligature wire prepared for those who adopt the Angle method for regulating teeth. The success was most gratifying, and this Angle ligature wire will be found extremely useful in many difficult cases where the cavity has a margin extending beneath the gum. The ligature wire can be applied and twisted firm, and then pressed so as to expose all portions of the cavity, the wire remaining in place, which of course the silk would not do. Another mode of using the wire, suggested by Dr. J. M. Thompson of Detroit, also serves a useful purpose. In this the wire is first doubled into a loop, and the loop end twisted so as to form a tight rope-like end. The two ends of the wire are spread apart, then around the tooth, and twisted on the opposite side of the tooth to be filled. This is then cut off, and we now have a twisted loop of wire on both the buccal and lingual aspects. These are so bent as to lie over against the tooth, the rubber is slipped on, and the ends turned back. By this means the rubber can be held even on a short tooth where it would be difficult to use a clamp.—R. OTTOLENGUI, *Items.*

MARRIAGES.—H. K. Barnett, a dentist of Upper Alton, Ill., was married to Miss Sarah B. Rodgers of Upper Alton, Nov. 15.—C. Branch, a dentist of Decatur, Ill., was married to Miss Bessie Crossley of Monticello, Ill., Nov. 29.—J. M. Day, a dentist of Waynesville, O., was married to Mrs. Erna Geddis of Lowell, O., Dec. 24.—P. Earle, a dentist of Grand Rapids, Mich., was married to Miss Vesta Long of Lake Odessa, Mich., Nov. 26.—R. M. Gaylord, a dentist of New Haven, Conn., was married to Miss Katherine E. Willcox of Chester, Pa., Nov. 30.—E. H. Grace, a dentist of Logansport, Ind., was married to Miss Clara Fouts of Deer Creek, Ind., Dec. 21.—G. A. Hickman, a dentist of Covington, Ky., was married to Miss Meta Graber of Cincinnati, Dec. 2.—E. Hohmann, a dentist of Nashville, Ill., was married to Miss Hannah Umbeck of California, Mo., Dec. 29.—F. J. Kinley, a dentist of Healdsburg, Cal., was married to Miss Mabelle Parker of Berkeley, Cal., Nov. 15.—Harry Leslie, a dentist of Utica, N. Y., was married to Miss Harriet Wendt of Utica, Dec. 27.—J. W. Manning, a dentist of Philadelphia, was married to Miss Dana Oliver of Philadelphia, Nov. 26.—E. H. Munroe, a dentist of Columbiaville, Mich., was married to Miss Blanche McNevin of Columbiaville, Dec. 21.—H. L. Prettyman, a dentist of Kansas City, was married to Miss Elizabeth Nugent of New London, Ia., Nov. 9.—Jennie Morrison, a dentist of Milwaukee, was married to Alonzo Widger of Trenton, Wis., Dec. 7.

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VOL. X. DECEMBER, 1904. No. 12.

The Dental Digest

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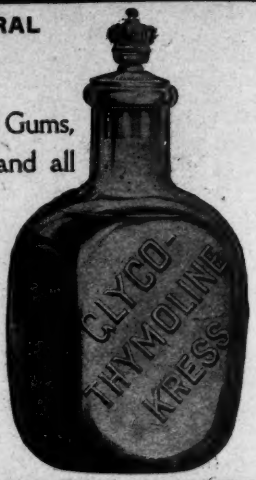

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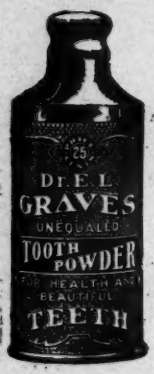

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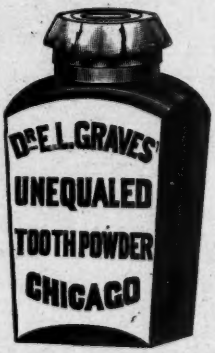

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Per Set 14,	$ 1.00	less	10%	each,	$ 0.90	net	per set	$0.90
11 sets	10.00	"	10%	"	9.00	"	"	0.81¾
29 "	25.00	"	10%	"	22.50	"	"	0.77½
60 "	50.00	"	10%	"	45.00	"	"	0.75
125 "	100.00	"	10%	"	90.00	"	"	0.72

FLAT BACK TEETH (Long Pin)

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Quantity rates in proportion.

Fellowship Teeth are made in our own factory by skilled workmen and we therefore know exactly whereof we speak.

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SEE HERE

Dr.

To 1 Doz. Burs @ - -	$1.00
To 1 Doz. Burs, recut, - -	0.45

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Apply this lesson to your entire instrument account and mark results.

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Being manufacturers of Handpieces, we are equipped to make a specialty of Handpiece Repairing.

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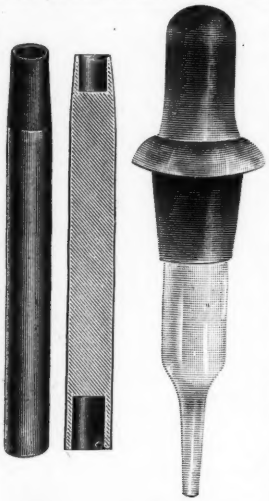
Have you ever realized that to secure the most desirable results in using plastics the first care should be to select the best material for your purpose and then to use it in the correct proportions?

In Cements the Best Made To-day is Fellowship



This is not merely our own assertion, but also the unalterable opinion of thousands of our customers.

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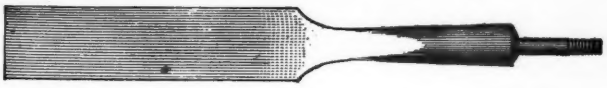

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Price, with hard rubber handle . . . . **75 cents**

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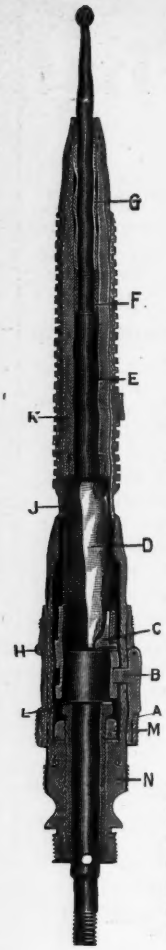

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Simplicity of Construction
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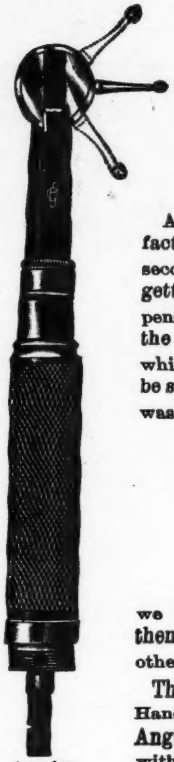

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"Fellowship" Angle Attachment and Angular Handpiece

we have solved the problem, and guarantee them to require less repair and to outwear any others on the market.

The Angle can be attached to our "Fellowship" Handpiece, or to the "No. 6" or "No. 7"; and the Angular Handpiece can be used with our own or with any standard slip-joint.

The bur can be held at either an acute, right or obtuse angle, thus giving all desirable positions.

Angle Attachment.

Bur for both Instruments.

These instruments take a bur with groove in shank by which it is held. If you have a stock of "No. 2" angle or of Davis burs on hand, we will, without charge, fit them to our angle.

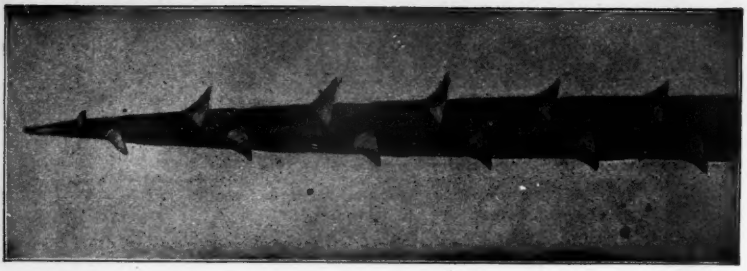
PRICES:

Angle Attachment,	**$7.00**
Angular Handpiece,	**7.50**
Burs, per dozen,	**1.00**

Dental Protective Supply Co.

1101 Champlain Building, Chicago.

BRANCH 818 REAL ESTATE BLDG., PHILADELPHIA.



This cut is made from a micro-photograph of a "FELLOWSHIP" BROACH, showing it enlarged about twenty-five times.

"Fellowship" Broaches are made from the finest spring-tempered steel and are barbed on three sides only, which makes them stronger and less liable to break than the Donaldson and similar broaches, which are barbed on four sides.

"Fellowship" Broaches are made by skilled workmen and every instrument is tested before leaving the factory.

"Fellowship" Broaches were the first of superior quality offered the dental profession at a reasonable price, and are now, as then, the **peers of any broaches at any price.**

Any supply house can make a fair profit retailing broaches at $1.00 per dozen. We suggest that you ask the Trust houses why they have charged outrageous prices all these years.

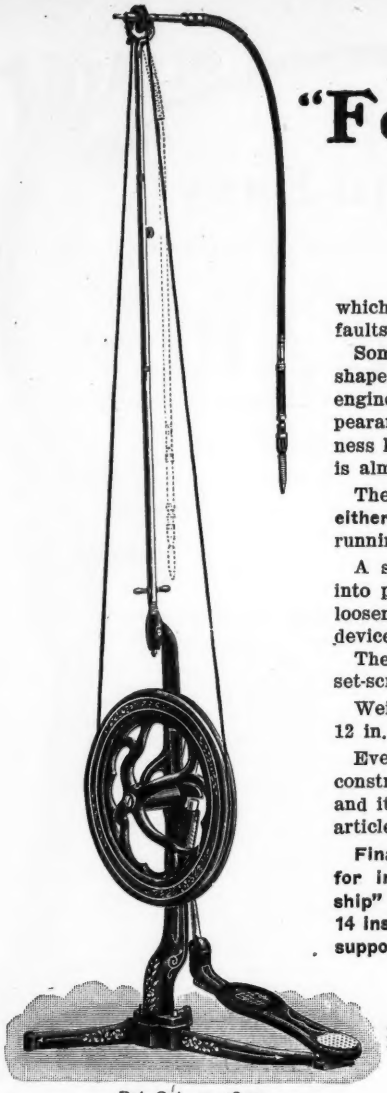
"Fellowship" Broaches are put up in five styles — extra fine, fine, medium, coarse, assorted—and they sell for $1.00 per dozen, $5.50 per half gross, $10.00 per gross.

Since we have made it possible for you to buy broaches at a reasonable figure, do we not merit your trade in this line? Insist on having "Fellowship" Broaches. If your dealer can't or won't supply you, send to us.

Dental Protective Supply Co.

1101-4 Champlain Bldg., CHICAGO.

818 Real Estate Bldg., PHILADELPHIA.



Pat. Oct. 12, 1895.

IT IS THE

"Fellowship" Engine

which has every engine virtue and no engine faults. We make it so.

Some recent improvements, such as the dish-shaped wheel, rigid pitman, etc., make this engine the most artistic and attractive in appearance of any. All points of possible weakness have been strengthened, so that breakage is almost impossible.

The drop pulley-head has long bearings on either side of the wheel, which insure steady running and equal wear at all points.

A slight upward toss of the arm raises it into position and pressure on the thumb-piece loosens it. This is the most convenient locking device on the market.

The standard can be raised or lowered by set-screw.

Weight of driving wheel, 13 lbs.; diameter 12 in.

Every feature of the "Fellowship" engine is constructed upon correct mechanical principles, and it is the easiest running and most durable article of the kind yet offered to the profession.

Finally, the price is lower than that asked for inferior engines. We offer the "Fellowship" equipped with our universal handpiece, 14 instruments, oil can, flexible sleeve and arm support for

$37.00

DENTAL PROTECTIVE SUPPLY CO.

1101-4 Champlain Building, - - - CHICAGO

Branch, 818 Real Estate Building, Philadelphia

Slow and Easy

is a term which aptly describes two of the properties of

Ductile Alloy

In most alloys of this class there is an element of unreliability, as they usually shrink badly and wear away rapidly.

NOT SO HOWEVER WITH DUCTILE.

In this has been perfected an alloy which has none of these faults. Amalgamating readily and working easily, it sets slowly without shrinking, has wonderful resistance to masticating wear, and retains at all times a good color. It is guaranteed to be superior in every way to other alloys of its class and is therefore heartily recommended to practitioners seeking a filling material with the properties of which we speak.

PRICES:

Per oz.,	$1.50	less	10%	cash,	$ 1.35
" 5 oz.	7.00	"	10%	"	6.30
" 10 "	13 00	"	10%	"	11.70
" 20 "	24.00	"	10%	"	21.60

THE DENTAL PROTECTIVE SUPPLY CO.

1101-1104 Champlain Bldg., CHICAGO

Branch at 818 Real Estate Bldg. PHILADELPHIA

"FELLOWSHIP"

Right Angle Mallet

Invented by DR. S. G. PERRY, New York

This mallet is one of the simplest, strongest and most attractive instruments **for packing gold** ever offered to the dental profession. The bearings are long and efficient, the hammer having bearings on either side. The plugger points are inserted without the use of special pliers or long tapers, and it merely requires a slight pressure on the spring to release the point.

The **rapidity** of blow is regulated by the speed of the engine, and every revolution of the handpiece gives a blow.

The **force** of blow is regulated by the pressure brought to bear on the tooth.

The mallet can be attached to any handpiece.

Price of Right Angle Mallet, $6.00

Price per set of six plugger points (assorted), $2.00.

Dental Protective Supply Co.

1101-1104 CHAMPLAIN BUILDING, CHICAGO.

Branch at 818 Real Estate Building, Philadelphia.

Four Points

wherein our "FELLOWSHIP" slip-joint is superior to all others:

First—It is universal and will fit any handpiece.

Second—The locking device is simplicity itself and there is no cumbersome catch to hinder and annoy you.

Third—It is cheaper. Price complete (parts A, B, C), **$6.50**. Extra Sheath (A), **75** cents. Extra dog (C), **25** cents.

Fourth—It will last a lifetime, as the wear can be taken up. All other slip-joints might as well be thrown away when they start to wobble, but in ours the wear can be taken up. Notice the cone bearings at D, a feature possessed by ours alone.

DENTAL PROTECTIVE SUPPLY CO.

1101-3 Champlain Building,
CHICAGO.

Branch 818 Real Estate Bldg., Philadelphia.

IF TRIUMPHAL ARCHES WERE THE FASHION nowadays the dentists of the world would erect one to

"FELLOWSHIP" ALLOY

Do you realize that previous to 1897, when we brought it out, there was not an alloy on the market fit to put into the mouth, as the makers did not care to incur the trouble and expense necessary to produce a reliable article?

We were the first manufacturers who tried to give you an honest article, and "Fellowship" was the first tested alloy ever put on the market. It to-day stands without a rival despite the attempts of our numerous imitators. *"Fellowship" quality is and always has been the standard by which all other alloys are measured.*

"Fellowship" is at the top of its class because—it never shrinks, blackens the hand, nor discolors the teeth. It possesses great edge strength and density, so will stand a stress of mastication which no other alloy can. It sets quickly enough that the filling can be finished at one sitting. Most important of all, it is always uniform, as Dr. J. N. Crouse personally makes three tests from each batch, and guarantees it to be perfect before it leaves our factory.

Beware of imitations, as there is only one "Fellowship" alloy and it is never sold except under our name. Beware also of any dealer who offers you "Fellowship" at one cent less than our prices, for he is trying to palm off some spurious substitute. The following are the only prices:

$3.00 per oz.	$40.00 per twenty ozs.
12.50 per five ozs.	90.00 per fifty ozs.
22.50 per ten ozs.	170.00 per one hundred ozs.

DENTAL PROTECTIVE SUPPLY CO.

1101-1104 Champlain Bldg., Chicago.
818 Real Estate Bldg., Philadelphia

FELLOWSHIP
Temporary Stopping
IS TO-DAY WITHOUT A PEER
Recognizing that there was not on the market a really reliable material of this class, Dr. Crouse personally undertook the perfecting of a formula, and the result we now offer under our trade-mark.
The average temporary stopping shrinks badly, besides being more or less porous, but these faults have both been overcome in ours, with the result that "Fellowship" will act as a perfect seal for all cavity dressings and so allow the medicines used to exert their full influence.
Tests of its qualities have been made in the mouth under every possible condition, so we feel safe in saying that our temporary stopping will fulfill all the requirements of such a material.
Put up in White, Pink or assorted.
PRICE, 35 CENTS
—Made By—
DENTAL PROTECTIVE SUPPLY CO.
CHICAGO
PHILADELPHIA

The Bronson Pliers...

Actual length, 5¾ in.

These Pliers are made heavier than ordinary Pliers and will be found most useful instruments in practice for:

Inserting and removing wedges.

Removing small roots and loose, small teeth, avoiding use of forceps.

Removing scraps of split teeth hanging on the gum.

Inserting and removing matrices.

Pulling off tight bands in making pivot teeth or gold crowns.

Removing temporary fillings.

Removing and inserting pivot tooth pins.

Removing loose metal fillings from the mouth where ordinary pliers would slip.

We have enumerated above only a few of the uses this desirable instrument can be put to.

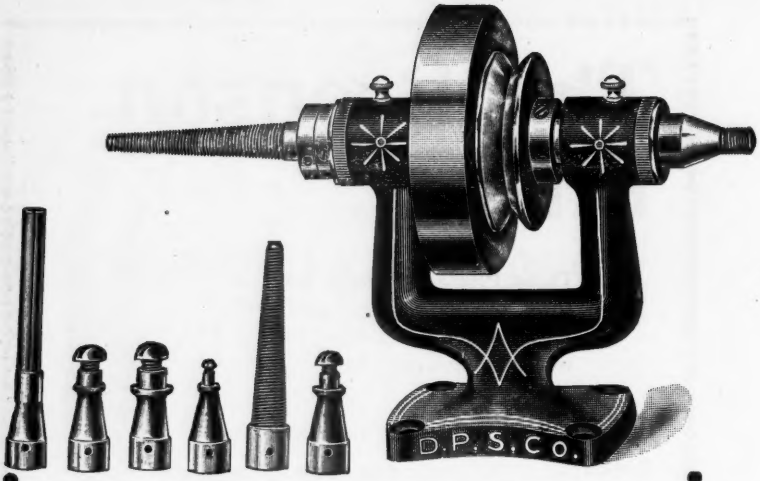
Nickel-Plated, Price $1.50

MANUFACTURED BY

Dental Protective Supply Co.

1101-1104 Champlain Bldg., Chicago.

818 Real Estate Bldg., Philadelphia.



THE "FELLOWSHIP"

CONE JOURNAL LATHE

has all the good points possessed by others now on the market, and in addition has two special features peculiar to itself, namely,

Dust-Proof Cone Bearings and Self-Truing Chucks

The spindle has cone journals, the right fixed and the left movable, so that the wear may be readily taken up. There is a jamb nut to tighten the movable cone when properly adjusted, and to prevent it from coming loose.

The lathe is also provided with dust-proof caps, which prevent the grit from carborundum and other abrasives from destroying the bearings.

The chucks are self-truing. The hole in them is conical, and when screwed on shaft they jam themselves against a cone of the same taper, so that they must true themselves.

Besides giving better satisfaction, and being cheaper, the "Fellowship" lathe will outwear any other.

PRICE, WITH 6 CHUCKS, $7.00

DENTAL PROTECTIVE SUPPLY CO.

1101-1104 Champlain Building, CHICAGO

Branch at 818 Real Estate Building, Philadelphia

BETTER, CHEAPER, SIMPLER.

IN manufacturing the "Fellowship" automatic mallet we have endeavored to avoid all defects existing in other mallets. The construction is simplicity itself, the direct and pull strokes being governed by the same mechanism. All the working parts are carried by the spindle, which reduces the friction. All those parts subject to wear are made of hardened steel. The workmanship throughout is the very best. The mallet gives a uniformly dead blow, the force of which may be varied to suit the needs or wishes of the operator. The adjustment to regulate this is made by turning a knurled thimble at one end.

Both ends are drilled to hold either the cone socket or automatic plugger points. The "grip" on either end is covered with black hard rubber.

Despite the fact that this instrument is equal to all and superior to most mallets now in the market, the price is as low as any and lower than most.

Price, Double Action - - - $6.00

Dental Protective Supply Co.

1101-4 CHAMPLAIN BUILDING, CHICAGO.

Branch, 818 Real Estate Bldg., Philadelphia.

"Fellowship" Burs

Cut Faster and Cleaner and Hold Their Edges Longer Than Any Others.

This is due to the fact that the twin or "dual" blades traverse the entire cutting surface, and these burs clear themselves when in use. They shave and do not grind the dentin, so are a comfort to the operator and a relief to the patient.

The selling price is the only cheap thing about them, as they are harder to manufacture and cost more to turn out than any others. A sample dozen will wed you to these instruments.

"Fellowship" Burs — *Sizes 00-7, per dozen, $1.00;* per half gross, $5.50; per gross, $10.00. Sizes 8-11, $1.50 per dozen Sizes 12-14, $2.00 per dozen.

Made in All Sizes and Shapes, For Universal and Angular *Handpieces.*

Dental Protective Supply Co.

1101-1104 Champlain Building, Chicago.
818 Real Estate Building, Philadelphia.

To look at this is like meeting an old friend, and like most old friends,

"FELLOWSHIP"

WEARS WELL.

It is today the best-known alloy in the world; is used by nearly all up-to-date practitioners, and is steadily growing in popularity. More of it sold than of any other four makes combined. Don't be fooled by imitations of "Fellowship"—they help us, but hurt you.

(Details on ad page 19.)

DENTAL PROTECTIVE SUPPLY CO.
CHICAGO PHILADELPHIA

Watt's Metal or Fusible Alloy

A large number of successful dentists are to-day using Watt's Metal for their plate work, and this class of denture is growing in favor with both profession and public.

Plates so made are strong, cleanly, and especially adapted to lower cases where weight is a necessary feature. It is further claimed that a better fit may be obtained than with either rubber or celluloid, and after years of use and exposure to the mouth secretions the denture shows no change in either structure or color. Plates may be made entirely of the metal or on the combination principle of Watt's Metal base and either rubber or celluloid attachment.

Another advantage is that by its use the practitioner is enabled to obtain a considerably higher price for a denture than is possible where only rubber or celluloid is used.

Finally, why need you pay for an ingot of the same size and formula, one dollar, when our price is only 50 cents

Manufactured by

THE DENTAL PROTECTIVE SUPPLY CO.

CHICAGO PHILADELPHIA

Bridges Anchored
By the Roach System

The attachments necessary to effect this are shown herewith, and may be briefly described as follows:

Part 1 is a round tube having an open side with flanges extending therefrom for its entire length. It is made in both 22k. gold and platinum.

Part 1.

Part 2 comprises the anchor attachment and consists of a split ball with two wings or projecting stems, which stand out at almost a right angle to each other. The split ball and upper stem enter the tube and the latter serves the purpose of closing top of tube in the finished work, also acting as a stop to obviate lateral movement in bridges anchored on but one side of arch; it also prevents partial dentures lifting at the heel.

Part 2.

The second, or riveted stem, is either embedded in the vulcanite of denture or soldered to the metal base where the latter is used. This part (2) is made of clasp gold, and also of composition metal. The split ball is made slightly larger than the tube, so that when forced to place the two halves of the ball are pressed together and the tension is maintained by the spring of the metal.

The parts are machine-made, so that they are uniform in size, interchangeable, and adapted for use with gold, vulcanite, continuous gum, cast aluminum, or any base that is desirable to use. The tube can be secured to the anchor tooth by means of gold, Richmond or porcelain crowns, gold inlays, gold or amalgam fillings.

Price per set (as shown above) in gold, $1.50

Further details may be obtained by sending for the descriptive booklet.

Sole Agents

DENTAL PROTECTIVE SUPPLY CO.

CHICAGO ✻ ✻ ✻ **PHILADELPHIA**

SPECIAL NOTICE

REGARDING

Second-Hand Goods.

We offer in the following a variety of useful appliances and material of which we are desirous of disposing before taking our annual inventory. Most of the goods have never been used but are simply shopworn. The prices are all quoted for **Spot Cash with Order** and under no circumstances will any purchases be accepted again for credit. All goods are at our Chicago salesroom.

	Regular Price		
Porcelain Crowns with composition metal pin These we have in from 2's, 4's and 6's and in fairly well assorted shades.	$ .35	each	$ .10
Fossiline Cement	1.50	per box	.50
Porcelain Gum Body, English Low Fusing	2.00	" "	.50
" " Enamel " " "	2.00	" "	.50
Creager Anesthetic Pencils	1.00	each	.50
Ideal Finishing Strips	.35	per box	.20
		or 6 boxes	1.00
Superior " "	.35	per box	.20
		or 6 boxes	1.00
Cruttenden Cement Syringes	2.50	each	1.00
Spooner Cotton Traps	.75	"	.35
Chip Bulbs	.20	"	.10
Sticky Wax	.25	"	.15
Hypodermic Syringes, glass barrel, without needles	.75	"	.25
Electrocaine	.75	per bottle	.25
Plate Burnishers	.75	each	.35
Napkin Holders, wire	1.00	"	.25
Melting Spoon, for copper amalgam	1.00	"	.35

Second-Hand Goods—Continued.

Antitortus, local anesthetic, 2-oz. bottle	$ 1.50	per bottle	$ .50
Spunk	.20	per oz.	.10
Broaches, barbed	1.00	per doz.	.50
Syringes, metal, self-filling, with fixed curved point	1.50	each	.50
Syringes, metal, self-filling, with removable point	1.50	"	.60
Crown Outfits, Lowry, seamless	13.50	"	8.00
" " Twist	25.00	"	7.50
" " "	35.00	"	10.00
" " Berry, less moulding ring	23.50	"	10.00
Gas Outfits, Hurd's 20th Century, complete with 2 cylinders, second-hand	42.00	"	25.00
Rubberdam Dam Holders, aluminum, Kerr pattern	.50	"	.15
Mouth Mirrors, plain, ebony handled, sizes Nos. 3, 4, 5, 6	.65	"	.40
Mouth Mirrors, mag., without handle, sizes Nos. 4, 5, 6	.50	"	.20
Aluminum Handles for Mouth Mirrors, knurled	.15	"	.05
Carborundum Lathe Wheels, square and round edged; diameters 1½ in. to 3 in.	.20 to .60	each	.15 & .20
Fountain Spittoons, Blair metal bowl	40.00	each	25.00
Modeling Composition, in bulk		per lb.	20
Moistening Cups for lathe wheel	1.00	each	.30
Fillers for Hypo. Syringe, rubber	.25	"	.05
Vulcanizer, C. D. M. Co.'s Davis make, 2 case, 4-inch pot			15.00
Vulcanizers, old-style Davis, 2-case		each	10.00
Root Trimmers, Sweeny	2.00	"	1.00
Saw and File Carriers for Engine, Brown's	5.00	"	2.50
Mouth Props, adjustable	1.00	"	.50

Any desired particulars concerning the above will be cheerfully furnished upon request to Chicago office.

THE DENTAL PROTECTIVE SUPPLY CO.

1101-4 Champlain Bldg., CHICAGO.

WANTS FOR SALE ETC.

FOR SALE. Space in this department for dentists who want to buy or sell practices; engage assistants; sell or exchange instruments, or make their wants known generally. It costs but five cents a word or initial. Please send cash with your order. DENTAL DIGEST, 2231 Prairie Ave., Chicago.

FOR SALE. Fine dental practice over $5,000.00 cash. Modernly equipped office. Will sell at inventory. Best reasons for selling. Address BOX 230, Saginaw, Mich.

FOR SALE. I have a good practice that will make money for a competent dentist in a clean, healthy, growing county seat. Price $600 00. Good references given and required. Good reasons for selling. A. B. STEVENS, D D.S., Orlando, Fla.

FOR SALE. Excellent cash practice and office furniture. New York town, 6,000. Ethical. Established five years. Cause of sale, ill health. $500.00 cash. Address BAKER, care Parkington & Slaight, 3 Union Place, New York.

FOR SALE. $4,000.00 practice and complete outfit. Town 3,500. Established eight years. One other office. $600.00 if sold at once. Account of sickness. Address WISCONSIN, care Dental Digest.

FOR SALE. Practice and outfit, Washington, D. C. Good reason for selling. Will introduce purchaser. For particulars address "WASHINGTON," care Dental Digest.

WANTED. Dentists to make their wants known in THE DIGEST. Costs but five cents a word or initial. Strictly cash with order.

WE ACCEPT IN TRADE:

Gold, Platinum or Amalgam Scrap.

Old Handpieces,
Old Angle Attachments,
Old Engines.
} **These where a new one is purchased.**

Estimates cheerfully furnished and your correspondence is, therefore, invited.

THE DENTAL PROTECTIVE SUPPLY CO.

CHICAGO. **PHILADELPHIA.**

A Tooth Powder

MADE FROM INDIAN CORN.

Perfect, Scientific, Beneficial,
Delightful and Refreshing
Cleanses without injury.
Removes cause of bad breath.
Alkaline and Antiseptic.

The latest scientific step, to prevent decay.
Can be used in any quantity, with great frequency,
(to prevent pyorrhoea) without abrasion.
Neutralizes all acids.

$2.00 per doz , delivered; 25 cts. per box, by mail.
Send 10 cts. for trial package, regular size, and try it.

The Vegetol Co., 11 E. Seventh St.,
Cincinnati, O.

IMPROVED ELECTRIC MOUTH LAMP

This Lamp is Made in a Neat and Compact Form as Illustrated

The plug, which admits of using the lamp on any electric light fixture, also embodies the resistance. The lamp holder is of hard rubber and has midway of its length a small finger contact by which current is thrown on or off. The incandescent lamp, which can be readily replaced when burned out, is enclosed by a metal shield to which is attached an adjustable mirror. All metal parts are nickel-plated and the outfit is supplied with 5 feet silk conducting cord and for attachment to either Edison, Thompson-Houston or Westinghouse sockets. Can be furnished for either 104 volt alternating or 110 volt direct currents.

When ordering please give full particulars as to style socket, also voltage, etc.

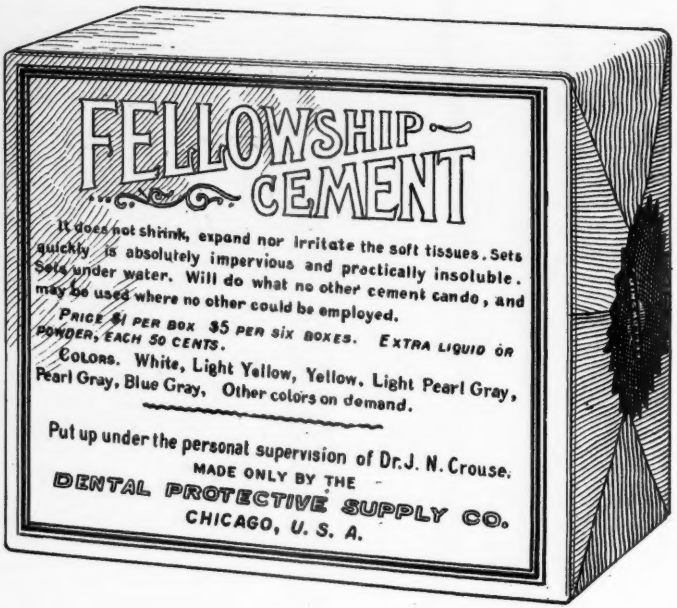
Price, Complete, $5.00

Manufactured by

The Dental Protective Supply Company

818 Real Estate Building, PHILADELPHIA

1101-4 Champlain Building, CHICAGO


FELLOWSHIP CEMENT
It does not shrink, expand nor irritate the soft tissues. Sets quickly is absolutely impervious and practically insoluble. Sets under water. Will do what no other cement can do, and may be used where no other could be employed.
PRICE $1 PER BOX $5 PER SIX BOXES. EXTRA LIQUID OR POWDER, EACH 50 CENTS.
COLORS. White, Light Yellow, Yellow, Light Pearl Gray, Pearl Gray, Blue Gray, Other colors on demand.
Put up under the personal supervision of Dr. J. N. Crouse.
MADE ONLY BY THE
DENTAL PROTECTIVE SUPPLY CO.
CHICAGO, U. S. A.

IT KNOWS NO RIVAL, BUT ITSELF.

FELLOWSHIP
Modelling Composition

This compound is an excellent material for taking impressions, and by its use the most difficult cases may be reproduced with an exactness seldom equaled. To soften it requires only water which is not hotter than can be borne by the hands, and this obviates any danger of scalding the patient's mouth.

It hardens quickly, with comparatively no shrinkage, and gives an accurate impression, sharply defining every ruga and line of the denture. It also insures a smooth model. If used according to directions there will be no crawling of the compound, nor will stickiness be experienced unless overheated in the softening process.

Supplied in two grades, medium and hard, and put up in half-pound boxes.

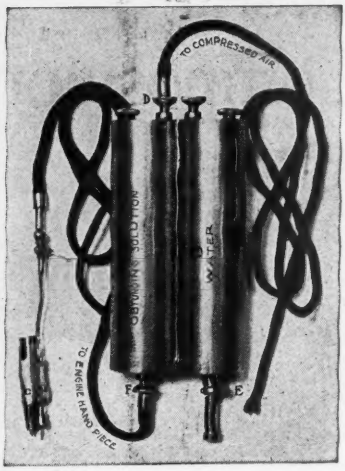
Price Per Pound, 75 Cents

Manufactured by

The DENTAL PROTECTIVE SUPPLY CO.

CHICAGO **PHILADELPHIA**

The Knowles Obtunder



We wish to call your attention to the "Knowles Obtunder," something entirely new and different from anything heretofore on the market, an instrument for use with COMPRESSED AIR and consisting of a double Cylinder (A and B), an attachment for hand-piece (C), interchangeable plugs to fit both cylinders and silk covered Rubber Tubing sufficient to connect hand-piece attachment with cylinder and compressed air pipe. The instrument may be used with any dental engine and is made to fit any hand piece.

By our system of tubing in interior of cylinder, the Obtundant Solution, ("non secret, the formula being given to each purchaser of the instrument") is conducted through the movable nozzle attached to hand-piece in form of Absolutely Dry Medicated Air thrown directly on the revolving bur. The bur is kept clean and cool, the cavity dry and free from debris. The most sensitive dentine excavated practically without pain. In ninety per cent of the cases absolutely painless.

The instrument was demonstrated at the "Fourth International Dental Congress," at St. Louis, where we excavated cavities for all comers, among them thirty-five for dentists themselves without a single failure. Ask your friend who was there; he will tell you that our corner attracted the largest crowd in the hall every hour in the day, and that we were selling to representative men from all parts of the world.

In addition to the Obtunding feature it is superior to hot air for drying out root canals.

In treatment of Pyorrhea keeps the pockets open and dry while operating. Thrown upon the back of the disc while finishing fillings will prevent heating. Will keep posterior cavities and those at gum margin dry without use of dam. Will keep root dry while setting crowns and bridges and is used in connection with many other operations.

If you cannot obtain a Knowles Obtunder through your dealer, if you also wish a Compressed-air outfit, and for further particulars, address

DR. W. J. McCUAIG, 100 State Street, CHICAGO

Flexible

Waterproof

Hall's Carborundum Rubber Disks

Are the Best

For the general work of Finishing Fillings, Shaping Teeth and Roots for Crowns and Bridges, Enlarging Spaces between Teeth, Grinding Porcelain Crowns, Facings, Inlays, etc. They are THIN, TOUGH AND DURABLE.

Samples of Disks and Literature will be sent on request, if you will kindly mention this Journal.
If your dealer will not supply you with our goods, send to the makers.

WM. R. HALL & SON

115 North 17th Street
PHILADELPHIA
PA.

Three Grits and Sizes

Price 40 cts. per dozen

CABINET No. 56. Patent applied for.

CABINET OPEN

For exclusive design, practical utility, and perfection of construction and finish, this cabinet is without a peer.
For detailed particulars of its many excellent features, also prices and terms, **send for our catalogue** and so become familiar with **the latest in modern office furnishings.**

THE AMERICAN CABINET CO., Two Rivers, Wis.

Marcinowski says:

BETA EUCAIN

Has undisputed sway in oral surgery.

Is absolutely non-irritant.

Is ¼ as toxic as cocain.

Its solutions are permanent.

Can be sterilized by boiling.

It is a grave error to employ cocain.

BETA EUCAIN

(Deutsche Zeitshrift f. Chirurgie, October, 1902.)

MAY WE SBND YOU REPORTS BY THE BEST-KNOWN SURGEONS AND DENTISTS?

SCHERING & GLATZ, New York.

SOLE AGENTS FOR THE U.S.

OXYCHLORIDE OF ZINC CEMENT

is sold under the Fellowship brand.

Per box $1.00

Dental Protective Supply Co.

DR. HAMILTON'S Ideal Pulp Capping Obtundent

It has no equal as a pulp capping. Painless, simple, easily applied. It will stop pain from exposed pulps or sensitive dentin immediately. It lasts much longer and goes much farther than any other preparation in use by the profession. Has been used for years, and is endorsed by some of the best men in the dental profession. Send for testimonial of hundreds. Try it.

Price, $1.50.

Sent by mail on receipt of price.

DR. J. C. M. HAMILTON

1114 Seventh Avenue, • • Beaver Falls, Pa.

Gold Bench No. 24.

ROLL TOP, OPEN.

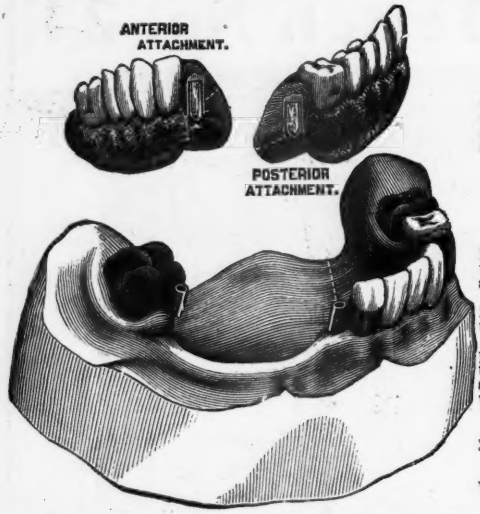
This bench is without question the finest and best ever made for general use. There is no other with so many drawers, with such a complete arrangement for tools and with so beautiful a finish. It has automatic locking arrangements, polished marble plate in the top and is fitted for both air and gas. It is made in solid mahogany and quarter-sawed oak.

We have other benches—14 styles—listed all the way from $8.60 to $44.00, but our No. 24 is the best made anywhere at any price. We are the originators and largest manufacturers of dental benches. We have made them every day for more than twenty years. We keep constantly on hand from three to five hundred benches, yet we have been informed that some of the Dental Depots tell their customers that they do not know of us. If they tell that to you, take it that they belong to the Trust and do not want to know any one on the outside.

We do not sell to dentists direct, but if you want a good bench at a fair price send for our catalogue and we will tell you where to buy.

JESSEN & ROSBERG, 405 W. Kinzie Street, CHICAGO, ILL.

YOU NEED LOOK NO FARTHER, FOR HERE IT IS



The Condit Attachment for all such cases as this.

Any good bridge workman would acknowledge that such a span would be too long for a stationary bridge, but not so for the

CONDIT REMOVABLE BRIDGE

It is practical because it fills up all space occasioned by absorption.

It is practical because there is no strain on abutment teeth.

And it is practical because it prevents undue pressure on the ridge, which cannot be said of the ordinary plate, with or without clasps.

Try it and you will be surprised with your success

Write for booklet and mention the Digest.

NATIONAL DENTAL IMPROVEMENT CO., Mt. Vernon, Ohio

SOLVED AT LAST

With this Press you can work *celluloid* with the same degree of success you can work rubber. No possible chance to burn plate or crack model.

Write for full description.

Price complete for gas or kerosene, $18.00

OUR

Glass Tank Gasoline Blow-pipe Outfit

is the simplest, most durable and perfect working apparatus on the market. With it you can get a steadier and hotter flame than with city gas.

Price complete with bellows, $11.50

WIGHTMAN DENTAL MFRG. CO.,

138 State Street, - - - Chicago.

VICTOR

Alternating Current Motor Lathe

PATENTED

The machine here illustrated is an ideal electric lathe, being powerful, compact, quiet-running and durable.

The motor is of the Tesla induction type, no commutator or brushes being required; this greatly adds to its durability as the only wearing parts are the bearings, and the shaft and bearings being of the very best material, one of these lathes with ordinary care will give from fifteen to twenty years' service.

Whether your current be DIRECT or ALTERNATING, if you are in the market for either a DENTAL ENGINE or a MOTOR LATHE, send for a copy of our catalogue.

VICTOR ELECTRIC CO.

55-61 Market Street, Chicago, Illinois

THE RECORD ON OUR TRAIL

GOLDSMITH BROTHERS
UNITED STATES MINT sells us sweepings because we pay most. Send YOUR scrap. DO IT NOW! Estimates sent if you wish.
GOLDSMITH Gold
We proudly boast
Is bo't and sold
From coast to coast.
Best by test.
Price does
rest.
Used your solder
8 years.
F. H. SKINNER, Chicago.
Your plate best I ever used.
F. A. HIGGINS, Bellevue, O.
Well pleased with both solder and plate. W. B. BRUCE, Listowel, Ont.
Worked gold 8 years. Yours best I ever used. F. G. MICHEL, Albany, N. Y.
Your solder flows like water downhill. Thanks for promptness.
W. R. TYLER, Temple, Tex.
We use your plate and solder exclusively in our improved seamless crowns and bridges.
BERRY & CO., Chicago.
We use no gold but yours.
JESUP GOLD CROWN CO.
Jesup, Ga.
Like your gold better than any other.
H. P. SMITH, Sturgis, S. D.

WE HAVE MANY TESTIMONIALS FROM MANYWHERE—

Canada and every state in the Union—which convinces us that if our products were but given a fair trial we would have

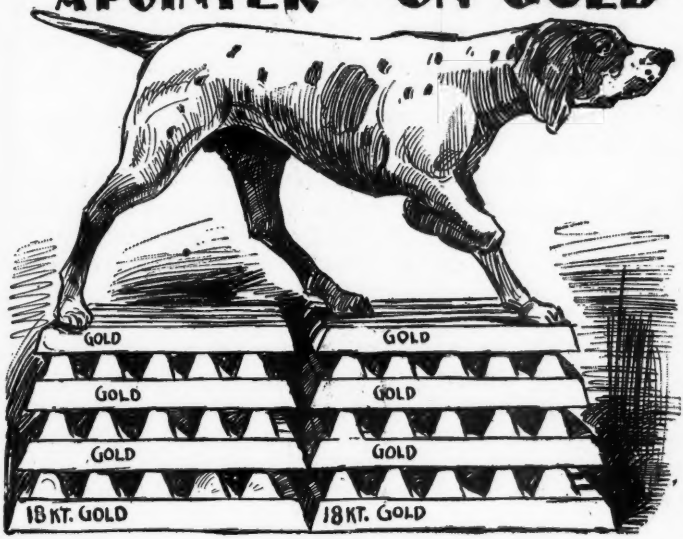
MANY TESTIMONIALS FROM EVERYWHERE.

☞ *Samples of gold solder and other specialties free to any dentist. Write on your office stationery or enclose card.*

GOLDSMITH BROS., ASSAYERS, REFINERS, MANUFACTURERS,

63-65 Washington St., CHICAGO, U. S. A.

A POINTER - ON GOLD.



GOLD PLATE This should be absolutely free from flaws, uniform in gauge and fineness, soft and pliable, of good color, and last, but not least, the price must be right. Our plate comes fully up to all requirements.

GOLD SOLDER To insure perfect results in plate and bridge work it is essential that the solder be of the same color as the plate. You take no chances when you use our plate and solder. Our solder does not "ball," and being chemically pure does not oxidize in the mouth. Write for samples.

FILLING GOLD Our foil and cylinders are chemically pure and do not contain carbon and impurities that are at times found in others. They are easily manipulated and our many satisfied patrons say it's hard to break the "Goldsmith habit" when once acquired. Goldsmith foil and cylinders are the lowest in price of any, and the cheapest at any price. Write for samples.

☞ SEE OUR PRICE LIST ON PAGE 45.

GOLDSMITH BROS.,

Refiners and Manufacturers of Dental Specialties,

63 Washington St., CHICAGO, ILL.

NEW YORK OFFICE: 29 West Forty-second Street.

GOLDSMITH BROS.

SMELTERS AND REFINERS

63 AND 65 WASHINGTON ST.

Chicago, April 24, 1903.

DEAR DOCTOR:--

Do you make or use Seamless Crowns? If so we are sure this will interest you. It is a well known fact that no cylinders or ferules can be drawn with uniform thickness by a hand draw-plate, as when driving the disk through, unless held perfectly true (which is almost impossible) the Gold varies in thickness, leaving one side so thin as to make it almost useless. Realizing this, we have gone to a great expense in having machinery made to draw these Cylinders in one operation, so that when tested with a micrometer the disks do not vary a particle.

Another very important point is the Gold used for this kind of work. The ordinary 22-karat gold as used for soldered crowns is not adaptable for seamless work, it being entirely too stiff, and when contoured to the shape required it often cracks, spoiling the work. Our special Gold is very soft and malleable, yet of the required strength to stand the strain, especially in bridgework.

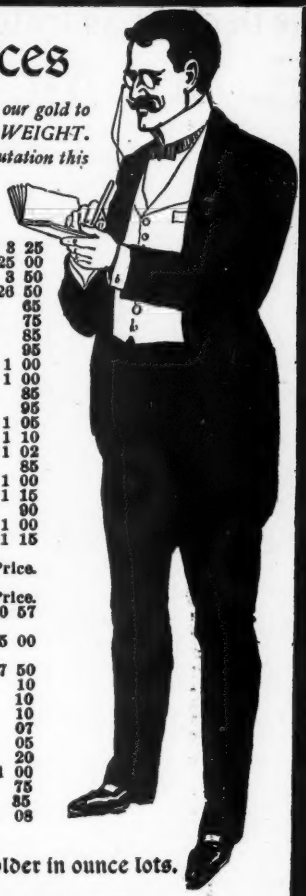
The price of these ferules is $1.05 per dwt. This is a great saving both in time and money, and you have no faulty disks and very little scrap gold. We shall be pleased to mail you free, upon application, one of our sets of fourteen 30-gauge fac-simile copper tubes for measurements.

Yours truly,

GOLDSMITH BROS.

Note Our Prices

and bear in mind that we absolutely guarantee our gold to be of the FINENESS specified and FULL WEIGHT. We mean to continue to uphold the good reputation this firm has enjoyed the past 35 years.



Price List.

Gold Foil, ½-oz.	$ 8 25
Gold Foil, per oz.	25 00
Gold Cylinders, ½-oz.	3 50
Gold Cylinders, per oz.	26 50
14K Solder, per dwt.	65
16K Solder, per dwt.	75
18K Solder, per dwt.	85
20K Solder, per dwt.	95
Coin Solder, per dwt.	1 00
22K Solder, per dwt.	1 00
18K Gold Plate, per dwt.	85
20K Gold Plate, per dwt.	95
22K Gold Plate, per dwt.	1 05
24K Gold Plate, per dwt.	1 10
Coin Plate, per dwt.	1 02
Clasp Metal, per dwt.	85
Clasp Wire, per dwt.	1 00
Platinized Gold, per dwt.	1 15
18K Gold Wire, per dwt.	90
20K Gold Wire, per dwt.	1 00
24K Gold Wire, per dwt.	1 15
Platinum Sheet or Wire, per dwt.	Market Price.
Platinum Iridio Wire, per dwt.	Market Price.
Pure Silver, per oz.	$ 0 57
Columbian Alloy, $2.00 per oz; 3 ozs. for	5 00
65 Silver, 35 Tin Formula, $1.00 per oz.; 10 ozs. for	7 50
Aluminum, per oz.	10
German Silver Plate, per oz.	10
Pure Zinc, per oz.	10
Pure Tin, per oz.	07
Pure Copper, per oz.	05
Pure Bismuth, per oz.	20
Broaches, per doz.	1 00
Burs, per doz.	75
Carborundum Strips, per box	85
Carborundum Disks, per box	08

5% Discount on 22K Gold Plate and Solder in ounce lots.

☞Send us your orders—We'll do the rest.

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No Dental Laboratory is Complete Without
E. J. McCORMICK'S

Acknowledged Everywhere

The Pink of Perfection

Price List

No.		Per lb.
1	—Light Orange	$2.25
2	—Medium Orange	2.25
3	—Dark Orange	2.75
4	—Mottled (Light Red)	2.75
5	—Mottled (Dark Red)	2.75
6	—Maroon	2.75
7	—Nubian or Jet Black	3.00
8	—Ordinary Black	2.25
9	—Light Pink	5.00
10	—Medium Pink	5.00
11	—Deep Pink	5.00
12	—Brown	3.00
13	—15 minutes for repairing	2.25
14	—Palate or Flexible	3.00
15	—Gutta Percha for Baseplate	2.25
16	—Gutta Percha Vulcanizable	3.00
17	—Gutta Percha for Filling (per oz.)	1.50
18	—Red Weighted	4.00
19	—Black Weighted	4.00
20	—White Rubber	5.00
	Gladiator	3.00
	Anaconda	4.00
	Rubber Dam (medium, per yard, in rolls 5 in. or 6 in. wide)	1.50
	Rubber Dam (thin, per yard, in rolls 5 in. or 6 in. wide)	1.00

THESE SUPERIOR RUBBERS

are the best adapted in the world for dental purposes, and are well known for their great strength, exceptional elasticity and beautiful finish, also for the ease with which they are packed.

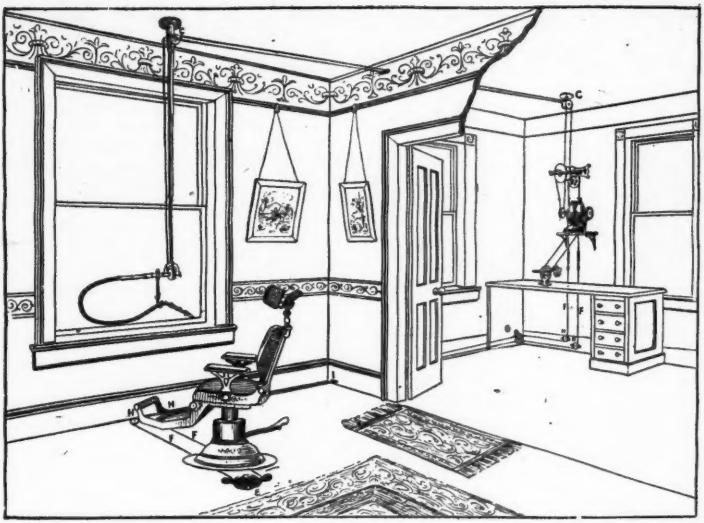
Ask Your Dealer for Them

IF NOT OBTAINABLE SEND TO

Imperial Rubber Works

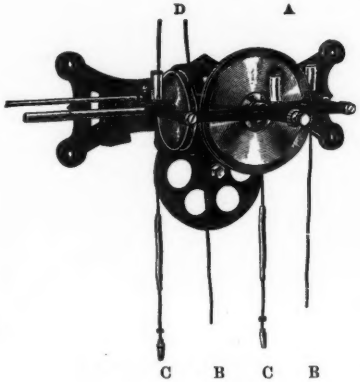
E. J. McCORMICK, Prop.

26 West Broadway, New York



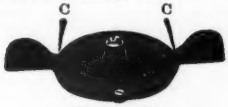
We show here a combination of lathe and dental engine operated by one motor and especially adapted to the alternating current or water power, as well as the direct current A controller or speed regulator and foot switch are used which are practically perfect in their control of the engine and in that capacity do not interfere with the use of motor for lathe purposes. We also have a combination of motor lathe with pulley mounted on one of the chucks used to drive the controller, which in turn drives the engine, making a splendid alternating current outfit and at a cost within the means of every successful dentist.

Look over these outfits and write us for circulars and prices.



Controller

A.—Friction disc. BB.—Belt from motor. CC.—Wire cables running to base-board and following base-board to the front of chair and then back to foot switch. D.—Engine cord running over ceiling pulleys to engine head.



Foot Switch

MANUFACTURERS,

L. J. MASON & CO.

108-110 E. Randolph St.,

CHICAGO, ILL.,

FOR SALE BY

THE DENTAL PROTECTIVE SUPPLY CO.,

CHICAGO AND PHILADELPHIA.

The Sims Hydraulic Engine Company

make the only reversible ball-bearing water motor on the market. Its success is attested by the number of machines sold and the constant increase of orders.

After being installed it requires no further attention, allowing the dentist to give his time to his work instead of fussing with his engine. This is a point worth considering. Our engine is simple in construction, positive in action and always ready to go.

This is a cut of our reversible motor showing position of ball-bearings at ends of spindle. The adjustable cones and spindle are made of hardened steel. The value of a machine so constructed is patent to all.

Our foot-switch here shown gives perfect control of the engine in starting, stopping, reversing and varying the speed. Its position is just back of the chair and has sufficient range of movement to be operated from either side of the chair.

Price: Reversible Motor No. 2, bracket, engine-head, foot-switch, two sets of floor pulleys, 25 ft. driving cord and 25 ft. wire cable, $50.00

Reversible Motor No. 2	32.50
Reversible Motor No. 3	38.50
One-way Lathe Motor No. 2	20.00
One-way Lathe Motor No. 3	25.00

Our Bulletins "A" and "B" show by cuts and description all details. To send them to you will afford us pleasure.

For sale by the Dental Protective Supply Co.

Sims Hydraulic Engine Co.

MANHEIM, PA.

Suggestion Number 2

For simple operations—say for example a plastic filling in a superior molar or bicuspid—try placing a section (about 1½ inches) of a No. 3 or No. 4 Absorbent Cotton Roll over the duct of Steno on the side of the mouth where you are to operate. In doing this stretch the soft parts *well out* and place the roll *high up* so that it will be drawn to place by the muscles and *stay there*,

Then place a second section of a No. 2 or No. 3 roll below this, parallel with and just above the margin of the gum, and you are ready for work. (Time, ten seconds.) This may be reenforced by pushing back with a section of dry roll at any time, if necessary.

If you are not familiar with each and all of the following preparations write for samples and suggestions for their use.

Red Cross Aseptic Dental Napkins	Absorbent Pledgets
Absorbent Cotton Rolls	Absorbent Canal Points
Non-Absorbent Rolls	Red Cross Bibulous Paper
Cottonoid	Carbonized Cotton
New Aseptic Paper Table Covers	Sinacine Plasters
(for Allan, Holmes or Harvard Table)	Red Cross Dental Floss

All are Sterilized and Surgically Clean

Sold by leading Dealers in Dental Supplies in every country in the world

Specify Johnson & Johnson's

JOHNSON & JOHNSON,
New Brunswick, N. J., U. S. A.

The MORGAN-MAXFIELD Disk Mandrel

Patented May 21, 1893.

IS THE BEST ON THE MARKET.

FOR SALE BY ALL DEALERS.

The Many Imitations and Infringements are Poor Substitutes.

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PLATINUM

IN SHEET OR WIRE FOR ALL PURPOSES. DENTAL TRADE A SPECIALTY. SCRAPS PURCHASED.

THE K. WITZEL BUR

Is the best known excavating bur on the market. Everyone is using them. There is a reason for it. We have the only factory in Germany where burs are made entirely by machinery. The Germans are the best steel workers in the world. You know what that means. Plain cut, per dozen, $1.50. Cross cut enamel fissure burs, $2.00 per dozen. Write for gross rates.

PINCHES REVELATION CUT BUR

Made in the Witzel bur factory by machinery. Best ordinary cut bur in the world. Chisel blade across head of bur. A beautifully cut instrument. Per dozen, $1.25; cross cut enamel burs, $2.00 per dozen. Gross rates on application.

THE PINCHES COMBINATION BUR

An entirely new shape, designed especially for providing smooth, even undercuts without enlarging the mouth of the cavity. They are sure to please you. Plain, $2.00 per dozen; cross cut, $2.50 per dozen.

HARVARD CEMENT

Is recognized as the best in the world and especially adapted for filling and inlay work. You take no chance with this cement. Large size, $2.25 per box; small size, $1 25 per box.

HARVARD BROACHES

Will surprise you. They are made by machinery and are positively guaranteed not to break or loose their barbs. Made in fine, medium, coarse and assorted. $1.50 per dozen.

ENGLISH TUBE STEEL HYPO. PTS.

With short, razor-edge points. Guaranteed not to break or rust as other needles. Straight, per dozen, $1.00; curved, per dozen, $1.50.

Send $1.00 to-day for a sample line of some of the above specialties. It will pay you. Additional information and prices cheerfully given. Dealers write for trade price list and agency for our goods. We can supply you with almost anything.

C. H. PINCHES

Importer and Exporter of Dental Specialties

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Dusseldorf, Germany

18c a DWT.

WEIGH your gold scrap, anything over 20K, we will smelt it, taking out all impurities, and return nicely rolled to any Gauge, guaranteeing a loss of not over 1-5 of one per cent (in weight).

Do not send sweeps or rubbish, but material you know to be gold and are willing to pay an honest price to have it put in working form.

Each lot refined separately and absolutely no tampering with the karat. We charge a fair price for the work and treat each customer honestly. Your gold is as safe in our hands as it would be in the safe deposit.

HASTINGS SMELTING WORKS, - HASTINGS, PA.

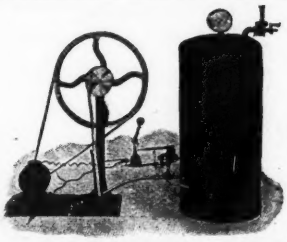
Pointed Screws, Three Sizes.

PLATINOID CROWN PINS.

You can save any kind of a root, and make it useful for a gold crown, by strengthening it with a Crown Pin. They are tapering, with a deep cut thread, and will cut their way into tooth-structure, making a solid foundation to build amalgam or cement around. They can also be used as posts for Richmond and other crowns, as the thread on the pin holds the cement. They are non-corrosive, will not discolor gold. Platinoid Crown Screws are superior to gold screws, as the metal is harder. They can also be used to anchor gold or amalgam fillings, extract roots, etc. We manufacture twenty specialties from Platinoid. Send for new catalogue.

$1.00 per dozen. All dealers keep them. Send to

MANHATTAN DENTAL CO., - 745 Sixth Ave., NEW YORK.



Air Pumps and Automatic Electric Compressed Air Outfits

Write for catalogue. Our outfits are noiseless. In writing please mention current used. We also sell **Hydraulic** and **Hand Air Compressors**. Write for prices on **Lathe Motors**, direct or alternating current.

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Oxyphosphate of Copper Cement is Unsurpassed. Per box $1.00

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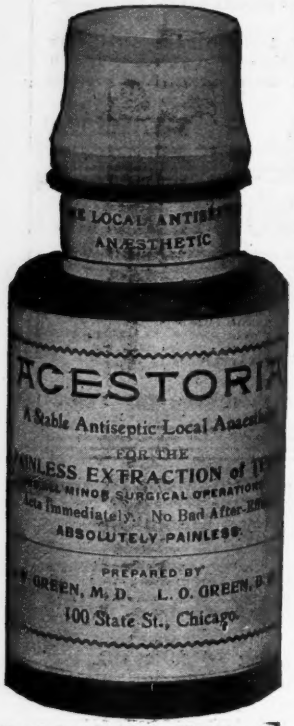
Local Anesthetic for Extraction of Teeth and Minor Surgical Operations



Exact size of our new official two-oz. bottle. $1.50.

CONTAINING:

The Essential Oils:	Antiseptics and Anesthetics:
Cajuputi,	Menthol, Plantego Maj.
Cassiae,	Phenol, Hyoscyamus,
Gaultheriae,	Glycerin, Jam. Dogwood.
Caryophylli.	

NITROGLYCERIN.

Sufficient cocain mur. is added to make a one per cent solution, which, in the presence of nitroglycerin, can not prcduce any depressing or bad effect.

DEAR DOCTOR:

We desire to call your attention to the **antiseptic** qualities of the local anesthetic, **ACESTORIA.**

A glance at the formula will satisfy you as regards antiseptic properties. To test its anesthetic action we desire to have you use a sufficient quantity to prove, positively, its value and our claim of having produced **the ideal local antiseptic anesthetic.**

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Dr. L. S. Tenney, Associate Prof. of Oper. Dentistry.
Dr. Geo. W. Cook.
Dr. J. H. Prothero. Dr. G. W. Dittmar.
Dr. J. W. Birkland. Dr. Elgin MaWhinney.
Dr. H. G. Fischer. Dr. Robt. Tuller.
Dr. F. H. Zinn. Dr. Chas. E. Bentley.
Dr. J. Elwood Dunn. Dr. G. H. Frey.
Dr. C. Deichmiller, San Francisco, Cal.
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Dr. R. E. Morriss, Kansas City, Mo.
Dr. Lew F. Miller, Berlin, Pa.
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Dr. C. N. Booth, Cedar Rapids, Iowa.
Dr. R. E. Smith, Sacramento, Cal.
Dr. W. G. Devore, Tempe, Ariz.
Dr. W. H. Caradine, Monroe, Wis.
Dr. T. A. Upham, Nashua, N. H.
Dr. D. L. Frazee. Plymouth, Ill.
Dr. E. E. Miller, Berlin, Pa.
C. P. Pruyn, D.D.S., M.D., Chicago.
S. H. Arthur, D.D.S., M.D., Scranton, Iowa.
J. Wooley, M.D., Chicago.
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J. R. Boynton, M. D., Clifton Springs, N. Y.
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Frank E. Simpson, Chicago.
F. F. Feaster, M.D., Scherr, Grant Co., W Va.

We extend to you the privilege of writing to any of the above mentioned gentlemen, and asking their opinion of the virtues of **Acestoria.**

Price, 2 oz., $1.50. When ordering by mail send 8 cents for postage.

For Sale by The Dental Protective Supply Co.
If you cannot procure Acestoria from your dental depot, order direct from

DR. L. O. GREEN

O. W GREEN, M. D.
L. O. GREEN, D.D.S.

100 State Street, CHICAGO, ILL.

This Tube Actually Sprays the Liquid

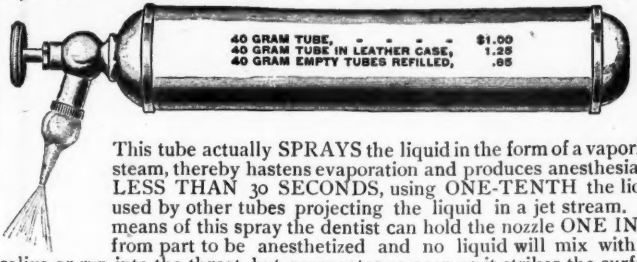
40 Gram Tubes Refilled for 85 cents

GEBAUER'S

ETHYL CHLORID C. P.

Ever Ready LOCAL ANESTHETIC Perfectly Harmless

This liquid has a boiling point of 12.5 C. and is guaranteed to be absolutely pure



This tube actually SPRAYS the liquid in the form of a vaporized steam, thereby hastens evaporation and produces anesthesia IN LESS THAN 30 SECONDS, using ONE-TENTH the liquid used by other tubes projecting the liquid in a jet stream. By means of this spray the dentist can hold the nozzle ONE INCH from part to be anesthetized and no liquid will mix with the saliva or run into the throat, but evaporates as soon as it strikes the surface.

MANUFACTURED BY

THE GEBAUER CHEMICAL CO., 4 Fleet St., Cleveland, O.

Trade Mark Registered.

Pustolene

cures abscessed teeth at one sitting.

We guarantee Pustolene, if properly used, to cure an abscess or putrescent pulp at one sitting.

Pustolene has been thoroughly tested and is now used by more than 10,000 Dentists throughout the United States and Canada.

Pustolene is in paste form, always ready to use, and is composed of the most powerful germicides known; will not discolor the teeth and has a very pleasant odor.

Pustolene will, "if used as a pulp capper," relieve an aching pulp in a very few minutes and will return the pulp to its normal condition, there to remain permanently.

Pustolene has gained its reputation solely on its merits and has found its way to all parts of the Globe.

FREE—Upon request we will send free one sample and testimonials of Pustolene to any Dentist who has not had the pleasure of trying it.

For sale at all Dental Depots. Price $1.00—$1.25 in Canada and Foreign Countries. If your Dealer does not have it, order direct and send us his name.

PREPARED ONLY BY

J. A. SPRAGUE & CO., Columbus, Ohio

FOR SALE BY

THE DENTAL PROTECTIVE SUPPLY CO., Chicago and Philadelphia

ODONTOLENE

THE KING OF LOCAL ANESTHETICS

No Sloughing — Because Odontolene is boiled and filtered before bottling.

No Hemorrhage—Because Odontolene contains the right amount of adrenalin chloride to control it.

No Bad After Effects—Because Odontolene is free from germ life.

No Pain—Because Odontolene is a perfect and harmless antiseptic anesthetic.

1-oz. - 50c
5-oz - - $2.00

We will send you a trial ounce for 25c. We have testimonials from every State and Territory in the Union.

Manufactured by

Louisville Dental Lab. & Mfg. Co.

T. M. Crutcher, D. D. S., Mgr. Box 686

Send for our new Fall Catalogue. It is full of good things.

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Dr. Howard's Dental Finishing Cloth Strips.

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New Improved Bristle Disks

THEY RUN ABSOLUTELY TRUE
THEY HOLD THE PUMICE

THEY ARE "ACKNOWLEDGED" THE BEST

FIG. 6014 "Stiff"

FIG. 6015 "Soft"

FIG. 6016 "Stiff"

FIG. 6017 "Stiff"

½ DOZEN DISKS ON A CARD (ANY STYLE) FOR 50c NET

IF YOUR DEPOT CANNOT FURNISH THESE SEND TO US

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"It didn't hurt a bit!"

WHY?

His Dentist gave him

"Antikamnia & Codeine Tablets"

When to Use Them

FIRST

To ease the nagging and shooting pains while operating; to quiet the nerves, and prevent the headaches and nausea which frequently follow operations, administer one Antikamnia & Codeine Tablet every hour. Give one before beginning operation

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One Antikamnia & Codeine Tablet given before and another one after extracting a tooth, will stop pain and allay irritability

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When a painful cavity exists, or a nerve or root is exposed, administer internally one or two Antikamnia & Codeine Tablets and fill the cavity with the powdered tablet, or apply it freely about the gums

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For toothache, earache and facial neuralgia, administer one Antikamnia & Codeine Tablet every two hours until relieved

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"GOLD MATRIX PORCELAIN"

A Vast Improvement On All Other Low-fusing Bodies

If you use Gold for Matrices, try this Porcelain, and you will be surprised at its superiority over anything you have ever used.

It Does Not Ball Up if given a little too much heat.

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It Does Not Lose Its Contour if given a little too much heat.

It requires no special furnace. It may be baked in any kind of furnace on the market

Price for Complete Outfit of 10 Shades, $10.00

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HAS no equal as a High-fusing Porcelain. The finest work in this country has been accomplished with Brewster's High-Fusing Porcelain. : : : : : :
The two bodies, "Foundation Body" and "Enamel Body," enable you to do a class of work which cannot be successfully done with any single body. : : : :

Brewster's Latest Combination Outfit

Consists of

3	Bottles	"Foundation Body"	High	Fusing
15	"	"Enamel "	"	"
1	"	" " XX	"	"
1	"	" " White	"	"
2	"	Pink Gum	"	"
6	"	"Gold Matrix" Body	Low	Fusing

Shade Guide, 24 Shades, Tools, Brushes, etc.,

Price Complete, $15.00

This gives you everything needed to do all kinds of porcelain work, both high and low fusing. : : : : : : :
Either an electric or improved gasoline furnace does equally well for baking. : :

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FINISHING
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INCLUDING

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Ask such College Men as

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Dr. J. E. Hancock, Dr. C. N. Thompson,

how they use them, and how they
could get along without them

FOR SALE BY ALL FIRST-CLASS DEALERS

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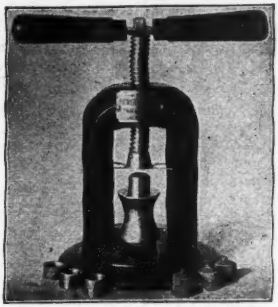
Small Size Complete,..... .....$5.50

BREWSTER'S SWAGING PRESS

This is a substantially made press and a useful addition to the Laboratory. It has proven satisfactory in every way for Inlay work, and is sufficiently strong for swaging thick plate for Crowns, and for backing Teeth, etc. It is well recognized that metal acts better under pressure than under the hammer, better adaptation is obtained with less tendency to spring out of place.



PRICE $10.00, COMPLETE

The width between uprights of press is two and one-half inches, and will therefore take a zinc die and counter die or other work up to that width. The steel cups are one inch in diameter, giving sufficient room for the largest matrices.

The press screw is made long to give ample vertical range. The press should be screwed to the bench.

The solid rubbers are for swaging heavy metal cusps, and not for Inlays The water bags are for swaging the thin Platina or Gold for Inlays. Should a water bag break, carefully dry out cylinder and plunger; do not allow any rust to accumulate in cylinder.

Directions for Use in Making Inlays with Brewster's Porcelain

The Cavity having been prepared with square edges—no undercuts or thin margins—it should together with the adjacent surfaces be rubbed with Talcum Powder. An impression is then taken of the cavity in cement. This is invested in Plaster of Paris, and the surplus cement which extends round the tooth on both sides of the cavity must be trimmed away to about one-sixteenth of an inch of the margins. More cement is now mixed very stiff, the fingers dipped in Talcum powder and the cement well kneaded. The first impression is Talcumed, and this second mix pressed into the first one (which has previously been set in Plaster) and allowed to stand until quite hard. Then separate and invest this second impression or model in one of the steel cups in plaster (or, if preferred, in one of the very shallow cups, in cement or sealing wax). Invest so that the center is slightly higher than edges of cup. When plaster is hard, place a square piece of Platina (1-1,000 of an inch thick) on the cement model; and with a pledget of cotton-wool press the platina down into the cavity. put into swager with water bag over the wool, and swage. Remove from swager and burnish out all wrinkles or folds that may be found on the margins. then anneal well in the furnace, carrying the heat well above the melting point of gold, replace on model and reswage with water bag, but without wool. Reverse press handles, remove cup from cylinder and examine matrix. If any wrinkles or folds still remain on margins, they must be burnished out, and if matrix does not appear to be perfectly adapted to all parts of the cavity it should be again annealed, and then, with water bag covering it subjected to harder pressure in the swager. Any cracks in matrix at bottom or near bottom of cavity will not affect fit of Inlay. Proceed to build in the porcelain; first, with "Foundation Body," when this is quite dry, bake. (Keep the "Foundation Body" sufficiently away from margins to allow for the thickness of "Enamel Body.") When baked, return to model, and, if baking the "Foundation Body" has caused any change in fit of matrix, the next swaging will correct it. After this last swaging proceed to fill in "Enamel Body," lay the dark shades in first, and bake, then add the lighter colors as necessary to finish.

The "Foundation Body" having been first baked into the matrix, will prevent any change in the latter's form during the baking of the "Enamel Body."

It facilitates the work to take a bite (after cavity is prepared) and cast models so that the matrix may be tried in as the building up of the porcelain proceeds. To allow space on model for inserting Inlay (which is, of course, larger than it will be after baking) the adjoining plaster Tooth should be sufficiently trimmed away.

The advantages claimed by the advocates of the Swaging System of making Fillings (especially for posterior restorations) are, greater accuracy of fit, saving of time, and less discomfort to the patient. Where much of this work is being done, several impressions may be made on one day, and the Inlays made on the next.

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Dr. Peck's Porcelain Inlay System.

A Practical Course Under Personal Supervision,

ALSO

A MAIL COURSE.

PERFECT SATISFACTION GUARANTEED BY EITHER METHOD.

Those taking the mail course receive models showing each step in the preparation of cavities, which are duplicated by them in natural teeth, and sent by mail for examination and criticism. When correct each succeeding step is taken up in the same manner until the full system is encompassed. This course requires from two to three weeks, occupying the dentist's leisure hours only.

For those who prefer personal demonstration, a laboratory has been equipped in Minneapolis for this work. The course is six days.

The price of demonstration by either method is $25.00.

The instruments and book of instruction are additional and can be bought separate. Price **$15.00**

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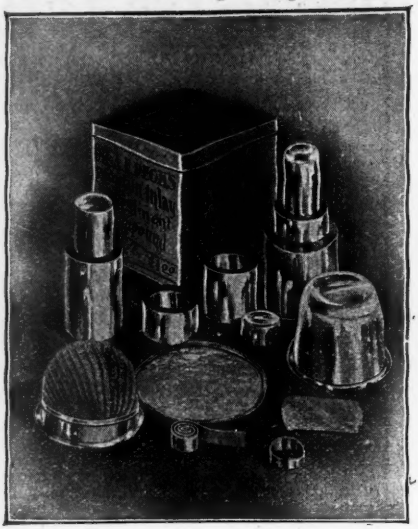

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USE HIGH SPEED AND LIGHT PRESSURE.

Cuts full size. Six shapes.

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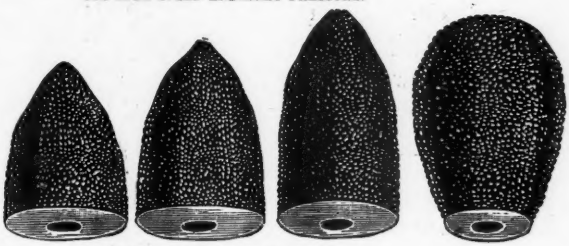

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THE ONE THAT NEVER FAILS

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Add 60 cents to a $5.00 order for 6 ounces, and secure Dr. R. B. Waite's new syringe with needles.

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The Acme of Safety to Dealer, Doctor, Patient

A statement of ingredients and a guarantee of satisfaction with every bottle.

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FOIL AND CYLINDER GOLD

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to thousands of highly pleased dentists from Maine to California, but to those few who are yet to know our gold we would like to

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you to the kind that's right in working properties—right for it is best and always uniform, right measured by the highest standards, right in price, for it is always the lowest and right where you expect it—for all orders reach you by return mail.

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TRADE "Abscess Conqueror" MARK

$1.00 P. O. or Registered Letter.

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Contoured Crowns
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A HARD RUBBER HANDLE
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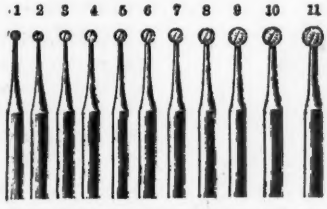

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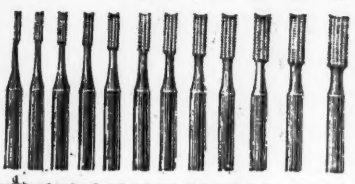

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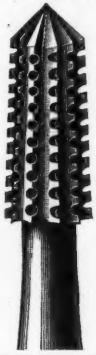

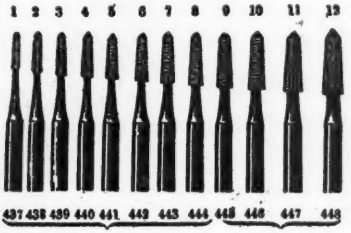

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Curviform, Converse,
ANGULAR BEAKED
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The Scientific Forceps of the day. Why?

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3rd—The grip on teeth is 50 per cent stronger than the old style forceps, therefore no danger of slipping off.

4th—Humane, Economical and Useful. Try them. Do your part and the forceps will prove to you their merits

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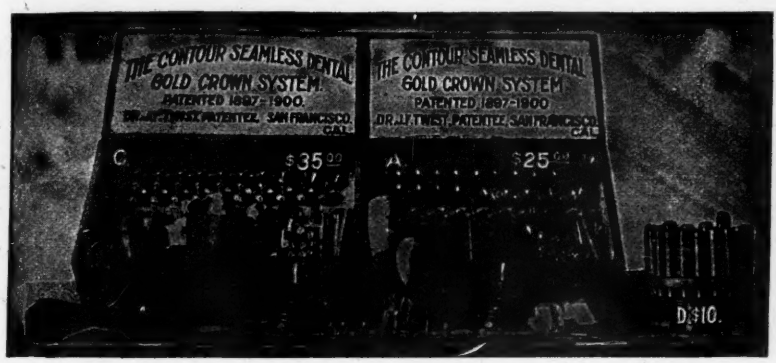

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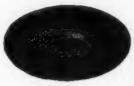

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PRICE, 10 CENTS EACH; $1.00 PER DOZEN.

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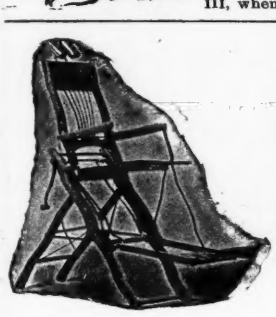

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J. W. McCONNELL, D. D. S.,
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You have been for years paying 50c to $1.00 per ounce for Local Anæsthetics, and it may be hard for you to realize that

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can be made to sell 8 **ounces for $2.00,** and give as good satisfaction as that you have been paying double that price for. If you are one of the **Doubtful Dentists, send 25 Cents for Sample.**

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Extra Pliable Burnish Cylinders.

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Pure Gold Cylinders, Gold Ropes, Crystal Surface Rolled Gold,
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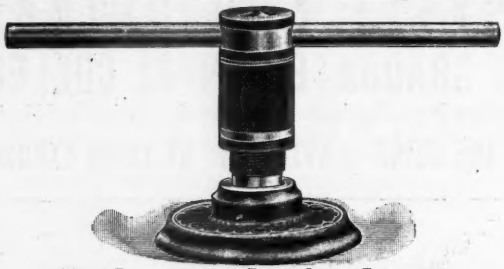

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This contouring device is operated by a screw instead of a blow, which insures an even pressure of great range, and is noiseless in its operation.

By the use of corn-meal, flour, or any like substance, a perfect adaptation may be obtained in the making of centrals, laterals, and canine teeth, in less time than by any other method.

Price $5.00. Send to

The Dental Protective Supply Co.

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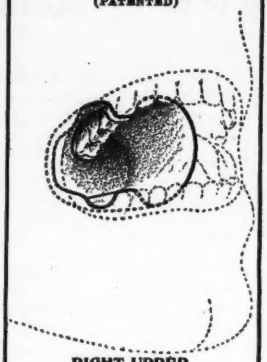

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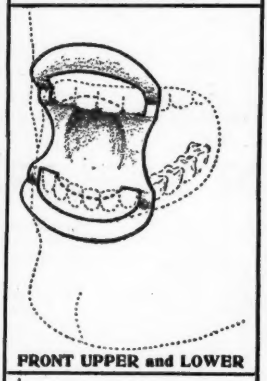
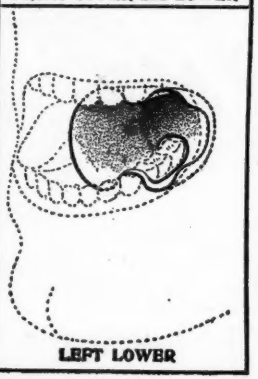


FRONT UPPER and LOWER



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are proving practical in every way. They are used in all dental operations where dryness is essential, and are a cheap substitute for rubber dam. See what some leading men say of them:

Dr. Geo. E. Hunt, Dean, Indiana Dental College, says: "*Dr. Hare's Mouth Props and Mirrors* have been in use in our college for some time and they fill a long-felt want. They are especially good in crown work."

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No Rubber Dam. No Clamps.

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The only swage that will **constrict** the gold cap to any model perfectly, no matter how bell-shaped the tooth.

The root measure of a broken down tooth is obtained by fitting accurately a copper band so there is no guess work.

The model determines every outline of the crown so that accurate occlusion, contour and neck measure is assured.

System complete.....$15.00 or
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Low fusible metal, 4 oz ... 50c.

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OVER TEN YEARS' STANDING WITHOUT A SINGLE FATALITY.

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Dear Sirs—Please send me by return U. S. Express $10 00 worth of Odontunder. I enclose check for same. It is working fine.
Very respectfully,
S. J. DOWNS.

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P. S.: I find that no other local anesthetic can do the work so well as Odontunder.

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So generally is Odontunder used that we guarantee to send you the name of some friend or classmate who is using it, with whom you can correspond.

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Teague's Impression and Investment Compound.

TEAGUE'S COMPOUND is a substitute for plaster for impressions, and is equally advantageous for soldering investments and making cast metal dies.

Teague's Compound is in many points superior to plaster. Its SMOOTHNESS permits its spreading evenly and freely into the spaces between the teeth or fissures in the crowns.

Teague's Compound DOES NOT ADHERE to the teeth, but gives an impression of the mouth which, for evenness of surface and glossy appearance, cannot be obtained with plaster.

Teague's Compound avoids the use of moulding sand, and with it a perfect die can be made direct from the impression as it comes from the mouth.

All of the annoyances incident to the use of plaster are overcome, and the finished die from Teague's Compound shows EVERY LINE, TOOTH, UNDERCUT and RUGA sharp, distinct and smooth.

Teague's Compound was in use for many years in private practice before it was put on the market. It was allowed to be compounded for several years by two dental firms successively. Since we have taken it again in our own hands they and other dealers are advertising substitutes, but the latter are inferior imitations of our compound, as we use earths from quarries owned by us and therefore make a safe, non-toxic and superior article. We have improved it as an investment compound, so that it will bear the greatest heat without cracking.

Our cans have full measure and over, and contain two pounds, four pounds, eight pounds and sixteen pounds each. (See cut above.)

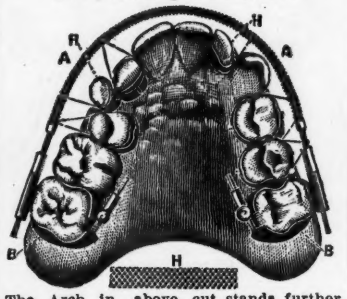
Complete directions for its use in taking impressions and in soldering of investments and making cast metal dies accompany each can of the compound.

PRICES—In Tin Cans, 2 lbs., 25c; 4 lbs., 50c; 8 lbs., 90c; 16 lbs., $1.75.

Manufactured only by TEAGUE DENTAL SUPPLY CO., Augusta, Ga.

For sale by the Dental Protective Supply Co.

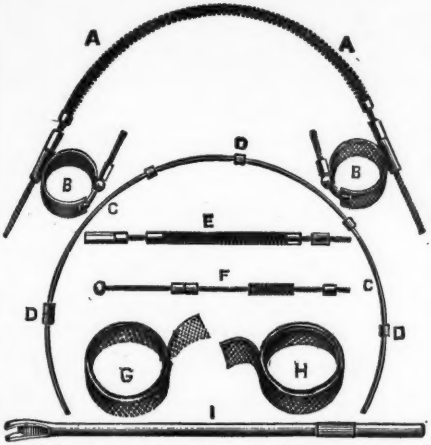
Parts "A B-H-G" are used in this case.
Price, including wrench, $3.00.



The Arch in above cut stands further from the teeth than in an actual case. This is done to better show the Arch and Ligatures.

THE J. E. CANNING
Improved Regulating
AND
Retaining Appliance.

This cut shows the combination most used, not only for enlarging the Arch, but for individual tooth movement. The portion of the Arch which surrounds the anterior teeth is fitted with a **REMOVABLE SPIRAL JACKET,** which retains ligatures at any angle from the moving tooth. The Arch can be used with or without this Jacket as the case may require.



Price $5.00.

PRICE OF PARTS:

A	Expansion Arch.....	80c.
B	Adjustable Clamp Bands, each.....	80c.
C	Retaining Wire.....	30c
D	Retaining Tubes (6)..	30c.
E	Elastic Pressure Jack Screw.....	80c.
F	Elastic Tension Traction Screw	80c.
G	Indented Band Material, .004...	25c,
H	Indented Band Material, .003.....	25c.
I	Wrench.....	15c.

The Improved Jack and Traction Screws, as seen in the complete set, exert a **CONSTANT, UNIFORM** and **ELASTIC** pressure against the moving tooth, and when once adjusted, positively need no further attention. The nuts all remain **STATIONARY,** the spring follows up **AUTOMATICALLY** the moving tooth and also acts as a **POSITIVE NUT LOCK.**

All Band Material is **ROUGH** or **INDENTED** and will never slip from the cement.

Booklet containing full instructions for attachment comes with all parts.

Appliances adjusted to models.

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THE DENTAL SPECIALTY COMPANY, 1628 Stout St., Denver, Colo.

'Goodyear Crown' FLEXOR Dental Gum

For more than twenty years sold under the trade-mark, "BOW SPRING."

Goodyear Crown Flexor. (Original "Bow Spring.)	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound
Goodyear Crown Pink.	¼ pound box at	$0.75	per box
	½ " "	1.40	"
	1 " "	2.60	"
	5 " "	2.50	per pound
Goodyear Crown Black. (Gray Black.)	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound
Goodyear Crown Ethiopian. (Jet Black.)	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound
Goodyear Crown Light Red. (Original No. 1 Improved.)	¼ pound box at	$0.55	per box
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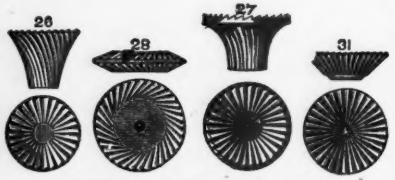
	1 " "	1.90	"
	5 " "	1.75	per pound
Goodyear Crown Maroon.	¼ pound box at	$0.50	per box
	½ " "	0.90	"
	1 " "	1.75	"
	5 " "	1.60	per pound

Goodyear Crown Dam	Box containing 5 yds. 6 in. wide,	thin	$1.00
	" " 5 " 6 " "	medium	1.30
	" " 5 " 7 " "	thin	1.15
	" " 5 " 7 " "	medium	1.50

Goodyear Crown Corrugated Soft Rubber Points.



PRICE PER DOZEN, 30 CENTS

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Orders should be accompanied by postal money order.

Goods will be delivered post or express paid.

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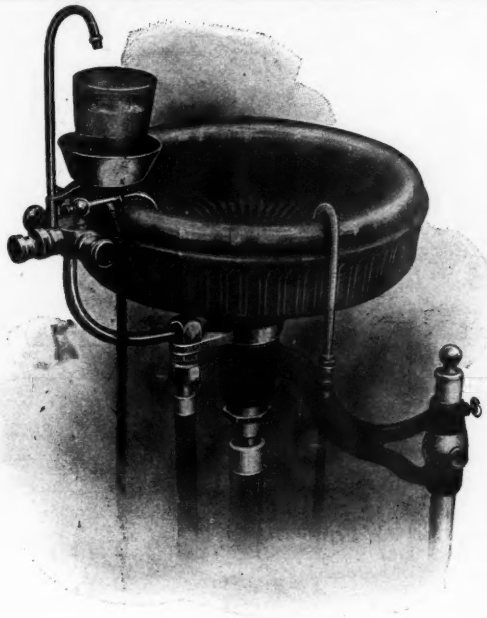

This Spittoon is the product of our own factory after years of carefully studying the needs of the dental profession. We have a Spittoon which is strong and durable. It is a single glass bowl—made of heavy lead glass, and is practically indestructible.

We have embodied some new and valuable features, not used in any other Spittoon on the market, notably among them, the Automatic **Valves**; no **depressions** in bottom of bowl for **dirt** to settle in; no **holes** in bottom or side to **leak** or to **weaken** the bowl; bowl can be taken out, if desired, in **one minute**, by simply loosening one screw; and lastly, the simple and **perfect** way it is constructed.

PRICES

Complete for Wall Bracket or any Chair, excepting Crown or High-Low Gould.... **$40.00**

When Stand, High-Low Gould or Crown Chair Arm is wanted, extra..... **5.00**

Boxed F. O. B. Buffalo.

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THE WHITESIDE CROWN

(Patented March 17, 1903, February 9, 1904)

A PERFECT TOOTH CROWN

Strongest. Easiest to Adapt.
Widest Range of Adaptability.

Ever see a LOWER BICUSPID porcelain crown, fashioned after the shape of NATURAL lower bicuspids, ready to mount without grinding to death?

The WHITESIDE CROWNS include an assortment of these among a full line of Incisors, Cuspids and Bicuspids, of natural shapes and life-like translucency and shadings.

The bases of all WHITESIDE CROWNS are so shaped that grinding is reduced to the minimum.

Booklet—A Treatise on Crown and Bridge Work—sent free on application.

The Whiteside Dental Manf'g. Co.

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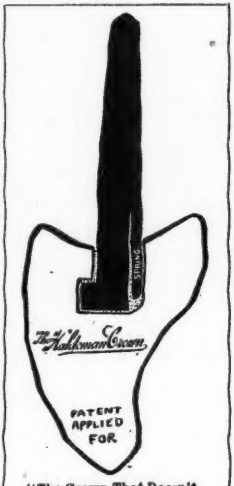
The Haldeman Crown

Why It Is The Best



"The Crown That Doesn't Come Off."

It is made of best porcelain, and has unsurpassed grinding and polishing qualities.

The post is removable, and out of the way while grinding for adaptation. Not having to grind around a fixed post, a more accurate fit can be secured in much less time than when a baked-in post is used.

The metal spring, by forcing the lug at bottom of post into the under-cut portion of the cavity, locks the post securely in position, so the crown cannot possibly come off.

The front or back of the crown may be ground without danger of exposing the post and repolished at will.

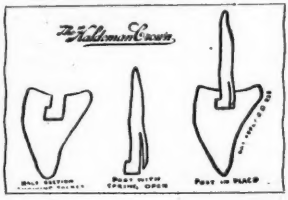
The post is **flat** on all its sides, fits closely into a **flat** walled socket, and it is impossible for the crown to rotate on post.

The close-fitting joint easily secured in the Haldeman crown requires but a very small amount of cement, thus reducing to a minimum the danger of disintegration from action of saliva.

The post may be soldered without destroying its strength, is small and strong, and not so likely to fracture small roots.

Should the crown be fractured it can be readily replaced without removing the post from the root.

It is especially valuable in cases where Logan crowns have been fractured, and post left in root. By reshaping exposed part of Logan post to conform to shape of Haldeman post, our crown can be easily placed in position on the Logan post without disturbing its seating in the root-canal.



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PRICE:

Single Crowns, 40c
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EUREMA
AN ANTI-OXIDIZER
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HARD SOLDERING SOLUTION
Will Solder Gold, Gold Filled, Silver, Brass, Iron, Steel, Nickel, Alaumnico or Plated Articles without the Aid of Borax.
EUREMA will flow Gold Solder over an Alcohol Flame.
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A LIQUID FLUX

That makes your solder flow like water WITHOUT THE AID OF BORAX.

Leaving a clean, smooth surface, thus reducing the work of finishing to a minimum.

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Full directions with each bottle.

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Eleventh and Clinton Streets, Philadelphia

..FOUNDED 1858..

The forty-ninth annual session will begin October 3, 1904.

The course of instruction covers three years of eight months in each year and is thorough, progressive, and practical. By lectures, demonstrations, laboratory experimentation, and continuous clinical practice, the student is fitted on graduation to enter at once on active professional work. Frequent quiz and review examinations are held throughout each session by the Faculty.

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Since its foundation, 2,607 graduates have received the diploma of the school, the list of alumni being larger than that of any other dental college in the world.

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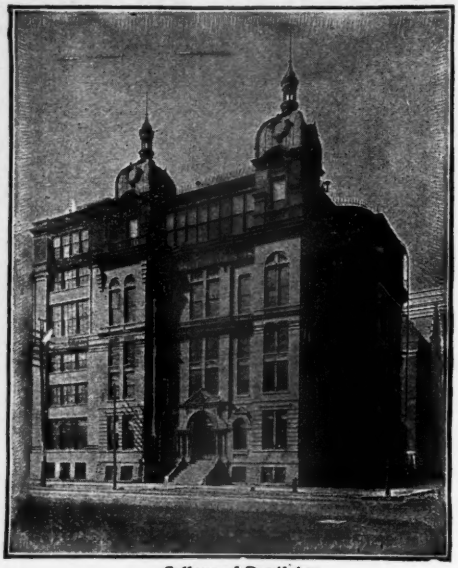

College of Dentistry.

College of Dentistry University of Illinois

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EQUIPMENT of Entire University, $3,320,000.00. Dental and Medical Departments—$625,000.00.

BUILDINGS. The University has twenty-four large structures. The Dental School is a six-story stone edifice, and covers one-fourth block.

TEACHERS. The University proper has 387 instructors. The Dental Department has 43 instructors and associates.

ATTENDANCE. From 758 students in 1891 the U. of I. now numbers upwards of 3,500. Attendance has tripled in two years, making the University fourth in rank of State Universities. The Dental and Medical Departments together have 1,000 students.

SUPPORT. The great and wealthy state of Illinois liberally provides for its maintenance, the State Legislature at this session granting $734,000.00. Besides, the government at Washington annually sends an appropriation of $25,000.00.

EXPENSES. The operating expenses of the entire University were a trifle less than $400,000.00; the Dental and Medical Budget, more than $100,000.00.

PROFESSORS. In the Dental College: Cigrand, Cook, Gallie, MacDowell, Grismore, Eckley, Dittmar, Jones, Powell, Roach, King, Steele, Burkholder, Zappfe, Brothers, Carpenter, Patton, Woods, McCauley and Hewett.

COMFORT. The Dental and Medical buildings are both modern—built for college purposes—possessing electric elevators and all appliances required to make the laboratories, class-rooms and infirmary complete.

LOCATION. The Dental and Medical Departments cover a block—Harrison, Honore, Congress Streets and Ogden Avenue bounding the properties. This location is the greatest Medical and Dental center on earth, yielding unsurpassed clinical advantages.

RECOGNITION. The Dental Department has membership in the National Association of Dental Faculties.

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